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سلسلة كتب الأستاذ

SCIENCE

4th PRIMARY FIRST TERM

MAIN BOOK

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Theme 1

Systems

Unit 1 Living Systems

Unit Concepts:

Concept 1 Adaptation and Survival

Concept 2 Senses at Work

Concept 3 Light and Sight

Unit Objectives

In this unit, we will study:

1. How do living organisms adapt?
2. How do animals and plants use their senses to gather information?
3. How do living organisms communicate and transfer information?

Get Started
What I Already Know





Difficulties that face living organisms to survive:

1. Hot or cold temperature
2. Availability of food, water or shelter

Over time, living organisms adapt to survive in extreme hot conditions.

Camel



To survive in the hot and dry desert:

- Its body is covered with thick hairy skin.
- It stores fats in its hump.

Palm Tree



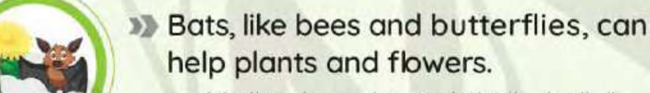
- It has strong roots (G.R)
  To resist strong winds in the desert.
- Its leaves are covered with a waxy layer (G.R)
  To protect them from the extreme hot climate.

Studying Bats

Bats
الخفافيش



- Bats are nocturnal animals. (They're active at night.)
  الخفافيش كائنات ليلية؛ أي تنشط في الليل.

- Bats, like bees and butterflies, can help plants and flowers.
  
  الخفافيش مثل النحل والفراشات تستطيع مساعدة النباتات.



- Bats can fly fast like birds.
  الخفافيش تستطيع الطيران بسرعة كالطيور.



- Bats locate their prey such as mosquitoes by a property called echolocation.
  الخفافيش تَستخدم خاصية تحديد الموقع بالصدى لمعرفة مكان الفريسة مثل البعوض.



Concept 1

Adaptation and Survival

Concept Objectives:

By the end of this concept, students will learn about:

- Types of adaptation:
  - a. Structural adaptation b. Behavioral adaptation
- Adaptation in some animals.
- Adaptation in some plants.
- Adaptation in humans:
  - a. Digestive system b. Respiratory system
- Humans changing the environment.

Key Vocabulary:

- Adaptation
- Habitat
- Extinct
- Survive
- Reproduce
- Organism
- Camouflage
- Digestive system
- Respiratory system
- Pollution
- Ecosystem
- Predator
- Prey

Concept 1

Adaptation and Survival

Lesson 1	
Activity 1	Can you explain?
Activity 2	Penguin
Activity 3	Adaptations for survival

Lesson 2	
Activity 4	Types of Adaptations
Activity 5	The Panther Chameleon
Activity 6	Plant Adaptations

Lesson 3	
Activity 7	Plant Scientist
Activity 8	Digestive System
Activity 9	Respiratory System

Lesson 4	
Activity 10	How Fish Breathe?
Activity 11	Humans Change the Environment

Lesson 5	
Activity 12	Record Evidence Like a Scientist: Penguin
Activity 13	Careers and Adaptation

Lesson 1

Unit 1

Activity 1 Can You Explain?



How do living organisms protect themselves from the extreme heat of the Sun



1 Starred Agama Lizard



It keeps itself cool by finding shade during hot, sunny days.

2 Camel



It stores fats in its hump to survive in the hot and dry desert.

3 Rodents (as jerboas) Reptiles (as snakes)



They bury themselves in the sand or underground. They're more active at night.





• كيف تتكيَّف الكائنات الحية مع ظروف البيئة وتحمي نفسها من أشعة الشمس الحارة؟

1 سحلية الصحراء: تحافظ على برودة جسمها عن طريق البحث عن الظل في الأيام شديدة الحرارة.

2 الجمل: يخزن الدهون في سنامه ليتحمل ظروف الصحراء.

3 القوارض (مثل اليربوع) والزواحف (مثل الثعبان): تقوم بدفن أنفسها في الرمال أو تحت الأرض، وتكون أكثر نشاطًا خلال الليل.

Reasons for Adaptation

- If the living organism adapts, it will survive and reproduce.
- If the living organism does not adapt, it will die or go extinct.

• إذا تكيَّف الكائن الحي، فسوف يعيش ويتكاثر.

• إذا لم يتكيَّف الكائن الحي، فسوف يموت أو ينقرض.

Activity 2 Penguin

» Climate is considered one reason for adaptation.

• يُعتبر المناخ سببًا من أسباب تكيُّف الكائنات الحية.

Example: Penguins

• A penguin is a non-flying bird.

• A penguin can stand on the ice all day.

• يُعتبر البطريق طائرًا، ولكنه لا يطير. • يستطيع البطريق الوقوف على الثلج طوال اليوم.

Habitat: Antarctica

• Antarctica has a polar climate that is one of the coldest places on Earth.

• تتمتع قارة أنتاركتيكا بمناخ قطبي، وهو أحد أبرد الأماكن على وجه الأرض.





1 Penguin's body

The penguin's body is covered with dense feathers and a thick fat layer to keep its body warm.

جسم البطريق مُغطى بريش كثيف وطبقة سميكة من الدهون حتى يشعر بالدفء.



2 Penguin's feet

The penguin's feet don't have feathers or a fatty layer (blubber).

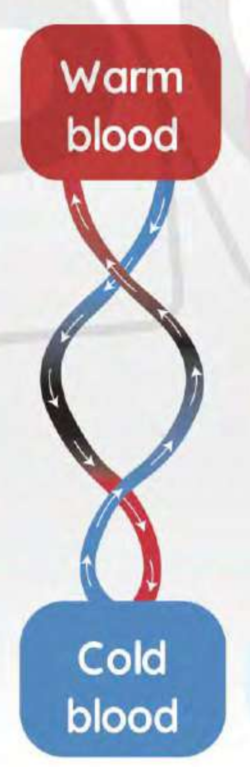
لا تحتوي أرجل البطريق على ريش أو طبقة من الدهون.



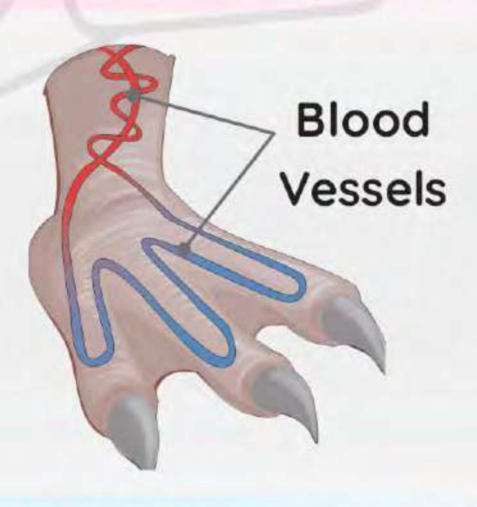
How does a penguin keep its feet from freezing



- The blood vessels that carry warm blood from the body weave around the blood vessels that carry cold blood from the feet to warm the blood vessels in the penguin's feet.



Warm blood moves down from its body to its toes.



Cold blood moves up from its toes to its body.

- تلتف الأوعية الدموية التي تحمل الدم الدافئ من الجسم حول الأوعية الدموية التي تحمل الدم البارد من القدمين مما يجعل الأوعية الدموية في أرجل البطريق دافئة لا تتجمد.
- الدم الدافئ يتحرك لأسفل من جسم البطريق لأصابع قدميه.
- الدم البارد يتحرك لأعلى من أصابع قدميه إلى جسده.



How long could a human stand on ice in barefoot



- A human would lose feeling in his/her toes after only a couple of minutes.



كم من الوقت يمكن للإنسان أن يقف على الجليد حافي القدمين؟

قد يفقد الإنسان الإحساس بأصابع قدميه بعد مرور دقيقتين فقط.



Activity 3 Adaptations for Survival

Adaptations
طرق التكيف

They are the characteristics that help living organisms survive and reproduce in the ecosystem.

هي الخصائص التي تساعد الكائنات الحية في البقاء على قيد الحياة والتكاثر في النظام البيئي.

Polar Bear الدب القطبي	Brown Bear and Black Bear الدب البني والدب الأسود
	 
Habitat	
• **Arctic Region** القطب الشمالي	• **Forests** الغابات
Way of Adaptation	
• **It has white fur.** To blend in with the snow to sneak up on its prey. • **It has thick fur.** To keep it warm. فراء بيضاء للتخفي بين الثلوج للانقضاض على الفريسة. فراء كثيفة للشعور بالدفء.	• **They have dark fur.** To hide among trees during hunting. فراء داكنة للتخفي بين الأشجار أثناء الصيد.

Do you know?

Some animals change the color of their coat according to the seasons.

Arctic Fox





Concept 1

Unit 1

Caracal and Fennec Fox
القط البري وثعلب الفنك




Lizards
السحالي



Habitat

- **Deserts** الصَّحَارِي
- **Deserts** الصَّحَارِي

Way of Adaptation

- **They have tan (brown) fur.**
  To hide and blend in with the desert environment.
- فراء بُنية للتخفي في البيئة الصحراوية.

- **They have colorful scales.**
  To hide among colorful rocks.
- حراشيف ملونة للتخفي بين الصخور الملونة في الصحراء.

Camouflage التخفي: It is a type of adaptation that animals use to hide from predators or sneak up on prey.

أحد أنواع التكيف الذي يساعد الحيوانات على الاختباء من الحيوانات المفترسة أو التسلل لفريستها.

Check your understanding?



Complete the following sentences from the words between brackets:

(Adaptations - Habitat - Prey - Predator)

1. .... is the environment where living organisms live.
2. .... is an animal that hunts (eats) another animal.
3. .... is an animal that is hunted (eaten) by another animal.
4. .... are the characteristics that help living organisms survive.

Exercises on Lesson 1

1 Choose the correct answer:

1. Adaptation helps living organisms in all the following, except ....
   a. survival b. hiding c. death d. reproduction
2. All of the following must adapt to stay alive, except a ....
   a. tree b. fox c. human d. rock
3. .... is (are) from the reasons that make living organisms undergo adaptation.
   a. Hot climate b. Cold climate
   c. Scarcity of water d. All the previous answers
4. The ...... keeps its body cool by hiding in shaded areas during daytime.
   a. starred agama lizard b. Arctic fox
   c. camel d. polar bear
5. Man wears light clothes to adapt to ....
   a. cold weather in summer b. hot weather in winter
   c. hot weather in summer d. cold weather in winter
6. Penguins live in Antarctica, which is considered a .... region.
   a. desert b. forest c. tropical d. polar
7. The presence of .... keeps a penguin's body warm in cold climate.
   a. dense feathers b. scales c. heavy fur d. thin fur
8. If you stand on ice in your bare feet, you will lose feeling in your toes after a few ....
   a. seconds b. minutes c. hours d. days
9. The body of a penguin is covered with thick downy feathers, except its ....
   a. belly b. back c. feet d. head
10. The bodies of all the following are covered with fur, except ....
    a. fennec foxes b. penguins c. polar bears d. brown bears

11 All of these are adapted to live in extreme cold weather, except ....
a. polar bears b. penguins c. Arctic foxes d. fennec foxes

12 Both penguins and polar bears may feed on ....
a. caracals b. fennec foxes c. agama lizards d. fish

13 A starred agama lizard could be prey for ....
a. fennec foxes b. polar bears c. Arctic foxes d. brown bears

14 Camouflage helps the animal in all the following, except ....
a. sneaking up on the prey b. being easily seen by a predator
c. being hard to be seen by a predator
d. hiding from the prey

15 All the following animals can blend in with the sandy desert, except ....
a. camels b. caracals c. brown bears d. fennec foxes

16 A rabbit could survive in a polar habitat if it had .... fur.
a. thick b. tan c. white d. a and c

17 Which of the following is an example of hiding or camouflage?
a. Camel's broad feet b. Camel's hump
c. Powerful parrot's wings d. Fennec fox's brown fur

2 Complete the following sentences from the words between the brackets:

1 If the living organism cannot adapt to its environment, it will .... (survive - die)

2 A camel stores .... in its hump to adapt to the desert environment. (fats - proteins)

3 The colorful .... help the starred agama lizard hide among rocks. (feathers - scales)

4 Antarctica has the .... climate on Earth. (coldest - hottest)

5 A .... can't stand on the snow barefoot all day. (human - penguin)

6 The blood vessels in a penguin's feet bring .... blood up. (cold - warm)

7 Both penguins and polar bears live in the .... regions. (Arctic - polar)

8 .... helps a caracal to sneak up on the prey. (Panting - Camouflage)

9 A polar bear has .... fur to stay warm in cold weather. (white - thick)

10 A .... bear can hide among trees in forests. (polar - black)

11 Both caracals and .... have tan-colored fur. (fennec foxes - Arctic foxes)

3 Put (✓) or (✗):

1 The blood vessels in a penguin's feet are away from each other. ( )

2 The feet of the penguin do not freeze because they have a layer of fat. ( )

3 Rodents hide underground in the desert in the daytime. ( )

4 A penguin is a flying bird that can stand on ice all day. ( )

5 In a penguin's feet, heat transfers from warm to cold blood vessels. ( )

6 All of a penguin's body is covered with thick feathers to keep it warm. ( )

7 Camouflage helps living organisms adapt to the climate conditions. ( )

8 Adaptation is considered an example of camouflage. ( )

9 Polar bears and penguins have thick fur to adapt to extreme cold weather. ( )

10 Fennec foxes live in deserts, while caracals live in forests. ( )

4 Choose from column (A) what suits it in both columns (B) & (C):

Column (A) Living organism	Column (B) Habitat	Column (C) It has
1 Penguin	a. Forest	a. white fur.
2 Black bear	b. Ocean	b. colorful scales.
3 Fennec fox	c. Arctic region	c. dark fur.
4 Polar bear	d. Antarctica	d. dense feathers.
	e. Desert	e. brown fur.

1 .... 2 .... 3 .... 4 ....

5 Write the scientific term:

1 The characteristics that help living organisms to survive and reproduce.

2 A non-flying bird that has thick feathers on its body.

3 They weave around each other to keep the penguin's feet warm.

4 It exists under the penguin's skin to keep it warm in cold weather.

5 It is the place where a living organism lives.

6 A type of adaptation that helps the living organism to blend in with the surrounding environment.

7 A cat with a tan-colored fur that lives in the desert habitat.

8 A bear that has white, thick fur and lives in a polar region.

9 A fox that has brown fur and lives in the desert.

6 Complete the following sentences using the words between the brackets:

(brown bear – cold – snow - trees – warm – polar bear – prey - predators)

1 A .... has white fur that helps it blend in with the ....

2 A .... has dark fur to hide between the ....

3 The blood vessels in a penguin's feet bring .... blood up, and .... blood down.

4 A .... is the animal that is hunted by ....

7 Cross out the odd word:

1 Penguin – Feathers – Thick fur – Fat layer

2 Polar bear – Thick fur – White feathers – White fur

3 Fennec fox – Caracal – Arctic fox – Penguin

4 Caracal – Camel - Agama lizard – Polar bear

8 Study the following figures, then answer the questions below:

					
Figure (1)	Figure (2)	Figure (3)	Figure (4)	Figure (5)	Figure (6)

1 Figures (..............) and (..............) live in polar regions.

2 Figure (..............) can hide among trees in the forest.

3 Figures (..............), (..............) and (..............) are desert animals.

4 Figure (..............) stores fats in its hump.

9 Study the following two figures, then complete the sentences below:

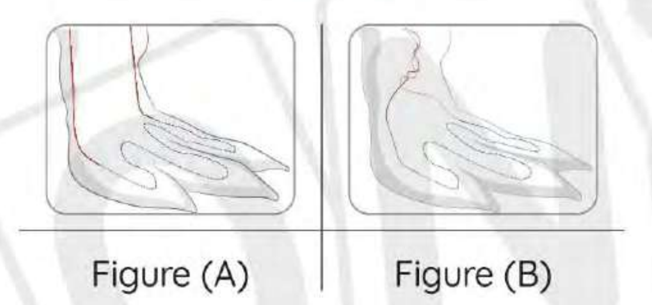


Figure (A) | Figure (B)

1. Figure (..........) shows the blood vessels in a penguin's feet.
2. If the blood vessels in a penguin's feet looked like those in figure (..........), they would freeze.

10 Give reasons for:

1. Adaptation is necessary for all living organisms.
2. The starred agama lizard always searches for shaded areas in the daytime.
3. A penguin can stand on the ice all day.
4. A penguin has a thick fat layer and dense feathers on its body.
5. The polar bear has thick and white fur.
6. Some animals undergo camouflage.

11 What happens if:

1. The blood vessels in the human's feet were like those in the penguin's feet?
2. The brown bear has the same color as the polar bear's fur?
3. The blood vessels in the penguin's feet weren't weaved around each other?
4. The starred agama lizard body wasn't covered in colorful scales?

Lesson 2



Unit 1

Activity 4 Types of Adaptations

An adaptation can be structural or behavioral.

Structural (Physical) adaptation

- It's a change that happens in the structure of the organism's body.
- هو التغير الذي يحدث في جسم الكائن الحي.


Polar bears have white fur.

Behavioral adaptation

- It's a change that happens in the behaviors (acts) of an organism.
- التغير الذي يطرأ على سلوك الكائن الحي.


Bird migration

Check your understanding?



Classify the following sentences by putting the letter (S) for structural adaptations and the letter (B) for behavioral adaptations:

1. A camel stores fats in its hump to adapt to the desert habitat. (S)
2. The agama lizard searches for shade to stay cool. ( )
3. The blood vessels in a penguin's feet weave around each other. ( )
4. Rodents bury themselves underground in the sand during the day. ( )
5. The fennec fox stays in the burrows on sunny days. ( )

(pink)	represents structural adaptations.
(blue)	represents behavioral adaptations.



1 Fennec Fox

Habitat: Desert



Extra large ears

- To lose heat and cool its body.
- له آذان طويلة ليفقد الحرارة ويبرد جسمه.



Tan-colored coat (Brown fur)

- To hide and blend in with the desert landscapes.
- To protect it from the hot Sun.
- له فراء بنية داكنة للتخفي في البيئة الصحراوية ولحمايته من أشعة الشمس.

It pants like dogs.

- To cool its body (by taking up to 700 breaths per minute).
- يلهث مثل الكلب لتبريد جسمه. (يستطيع اللهث ٧٠٠ مرة في الدقيقة).

2 Arctic Fox

Habitat: Tundra



Short ears and legs

- To stay warm.
- له أذنان وأرجل قصيرة ليبقى جسمه دافئًا.

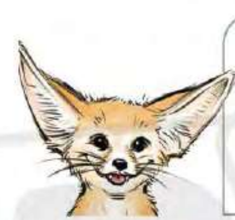
Thick fur coat

- To stay warm.
- له فراء كثيفة ليبقى جسمه دافئًا.

It has a white coat during winter, but it turns brown in summer.

- To sneak up on the prey in any season.
- له لون فراء أبيض في الشتاء ويتحول للبني وقت الصيف للتسلل على الفرائس في أي فصل من فصول السنة.

Both foxes have some similar adaptations





Both foxes' ears have a specialized shape.



- To strengthen their hearing sense to help them hunt.
- يساعد شكل الآذان لهما على تقوية حاسة السمع مما يساعدهما على الصيد.

Both foxes live in burrows.

- The fennec fox stays in burrows during the day to stay cool.
- يبقى في الجحور أثناء الصباح ليبقى جسمه باردًا.



- The Arctic fox stays in burrows during the night to stay warm.
- يبقى في الجحور أثناء الليل ليبقى جسمه دافئًا.



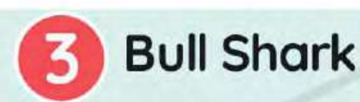
Both foxes have varied diet and learned to eat all kinds of things, including insects, fruit, plant roots, and prey remains.

- Because it is hard to find food in a hot, dry desert or a cold tundra.
- كلاهما يأكل أنواعًا مختلفة من الطعام مثل: الحشرات والفواكه وجذور النباتات وبقايا الفرائس لندرة الغذاء في الصحراء الجافة الحارة أو صحراء التندرا شديدة البرودة.

Notes:

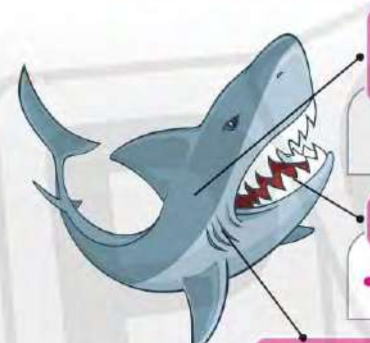
- In a tundra, the temperature may reach –50°C in the winter months.
- Animals that have a varied diet are flexible about what they eat and where they hunt, so they are well-adapted for survival.
- في التندرا، قد تصل درجة الحرارة إلى –٥٠ درجة مئوية في أشهر الشتاء.
- الحيوانات التي تتسم بالمرونة فيما يتعلق بما تأكله وأين تصطاد تتكيَّف جيدًا للبقاء على قيد الحياة.

represents structural adaptations.
represents behavioral adaptations.



3 Bull Shark

Habitat: Salt water - Fresh water



Its body is adapted to survive in both salt water and fresh water.

• يتكيَّف جسم قرش الثور للبقاء على قيد الحياة في كل من المياه المالحة والمياه العذبة.

Sharp teeth

• To cut the prey's flesh. • يمتلك أسنانًا حادة لتمزيق لحم الفريسة.

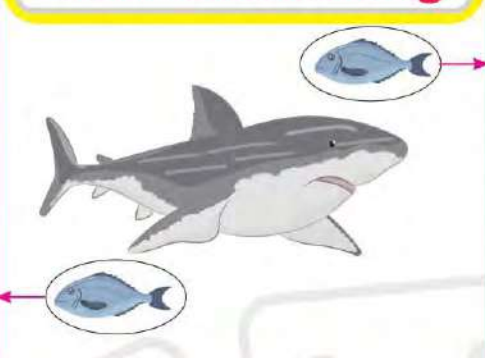
It uses a camouflage strategy called "countershading".

• To sneak up on the prey.

• يستخدم إستراتيجية للتخفي تُسمى التباين اللوني للانقضاض على الفرائس.

Countershading

If a fish swims underneath it and looks up, the bull shark may blend in with the bright light of the Sun due to its white belly.



If a fish swims above it and looks down, it may not see the bull shark in the shadow due to its dark back.

It can hunt in salt water and fresh water.

It eats different kinds of food (varied diet).

It can hunt in the day or at night. To surprise its prey.

Give a reason for...



- Bull sharks have less competition for finding food in fresh water.

Because most sharks can only live in salt water and there are no other sharks in fresh water.

• **تتمتع أسماك قرش الثور بمنافسة أقل للعثور على الطعام في المياه العذبة.**

لأن معظم أسماك القرش تعيش فقط في المياه المالحة، ولا توجد أسماك قرش أخرى في المياه العذبة.

Activity 5 The Panther Chameleon

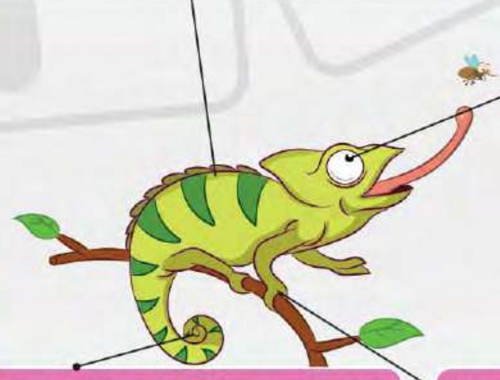
- The starred agama is a lizard that lives in hot and dry deserts.
- The panther chameleon is a lizard that lives in tropical rainforests.
- Both of them are reptiles and are covered with scales.

Panther Chameleon

Habitat: Tropical rainforest

It has bright-colored scales.

- To hide among green leaves and colorful flowers.
- أجسامها مغطاة بحراشيف ملونة للتخفي بالأوراق الخضراء والزهور الملونة.



Each eye moves independently in a different direction.

- One eye searches for food.
- The other eye is to avoid danger.
- عيون الحرباء تتحرك بشكل منفصل في اتجاهات مختلفة.
- عين تبحث عن الفريسة والعين الأخرى لتجنب الخطر.

Its tail looks like a hand. **V-shaped feet**

- To hold tightly on the branches of trees.
- لها أقدام تشبه حرف (v) وذيل يشبه اليد للتمسك بقوة بأفرع الأشجار.

In danger, it scares its attacker by:

1. Puffing its body with air.
2. Opening its mouth wide.
3. Changing the color of its scales.

- **عندما تشعر بالخطورة فإنها تخيف أعداءها؛ حيث تقوم بـ:**

- نفخ جسمها بالهواء. - فتح فمها باتساع. - تغيير لون الحراشيف.



Note:

- The panther chameleon doesn't have teeth or claws for defense.
- لا تمتلك حرباء النمر أسنانًا أو مخالب للدفاع عن نفسها.

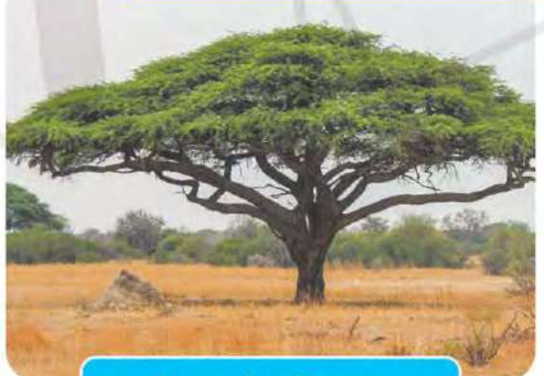
Activity 6 Plant Adaptations

- Plants can grow everywhere that sunlight shines.
- Plants have structural and behavioral adaptations, like animals, that help them survive in different environments.

• تستطيع النباتات العيش في أي مكان تصله الشمس.

• للنباتات تكيف تركيبي وسلوكي مثل الحيوانات؛ لتستطيع البقاء في البيئات المختلفة.

We will study two terrific trees, which are:



Acacia Trees

أشجار السنط

Live in

savannah

in Southern Africa

- Grassland habitats
- Its temperature is mild.
- There is an extreme lack of water and drought conditions.

• سهول عشبية.

• درجة حرارتها معتدلة.

• هناك نقص شديد في المياه وموجات من الجفاف.



Kapok Trees

أشجار الكابوك

Live in

Amazon rainforests

in Brazil

- It has soggy soil.
- It is characterized by strong winds.
- It is easy to find water where it is rainy most of the year.

• لها تربة طينية.

• تتميز برياحها القوية.

• الماء متوفر بكثرة حيث يتساقط المطر معظم السنة.

represents structural adaptations.
represents behavioral adaptations.

1 Acacia Tree
(Umbrella-shaped tree)

Habitat: Savannah

1 Roots

- It has taproot roots. G.R
(A very long root that grows directly downward)
(It may reach 35 meters below the soil)
To search for water in deep soil.



• لديها الجذر الوتدي (جذور طويلة تنمو لأسفل) (يمكن أن يصل طول الجذور لـ ٣٥ مترًا تحت سطح الأرض).
للبحث عن المياه في أعماق التربة.

2 Trunk



- It has a very long trunk that only a giraffe can reach its leaves.

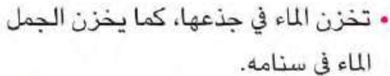
• لديها جذع طويل حيث لا يصل لأوراقها إلا الزرافة.

- It stores water in its trunk as a camel stores fats in its hump.



• تخزن الماء في جذعها، كما يخزن الجمل الماء في سنامه.

3 Leaves



- It has tiny leaves on its top G.R
To hold water and soak up sunlight to make food.

• لها أوراق صغيرة جدًا لمساعدتها على الاحتفاظ بالمياه وامتصاص ضوء لصنع الغذاء.

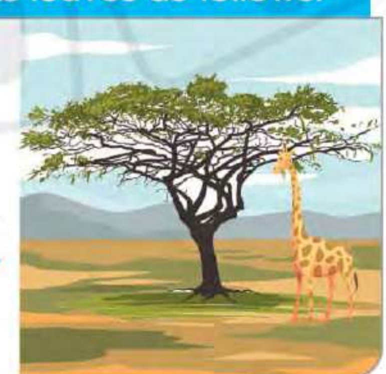
- It has sharp spines around the leaves. G.R
To prevent animals from eating its leaves.



• تمتلك أشواكًا حادة حول الأوراق لمنع الحيوانات من أكل أوراقها.

It can defend itself when a giraffe eats from its leaves as follows:

1. It produces a poison that makes the leaves taste very bad.
2. It sends smelly messages to the nearby acacia trees to start making the same poison.



• **تقوم شجرة السنط بالدفاع عن نفسها عندما تبدأ الزرافة في أكل أوراقها.**
- تقوم بإفراز سُمّ مما يجعل طعم الأوراق سيئًا جدًّا.
- ترسل رسائل كريهة الرائحة؛ لتحفز باقي شجر السنط على إفراز نفس السُّمّ.



2 Kapok Tree
(Umbrella-shaped tree)

Habitat: Amazon rainforest

1 Roots



- It has buttress roots (large wide roots) that grow up around the trunk.
  To hold the tree firmly in the soggy soil.
- They start up to 5 meters above the soil.

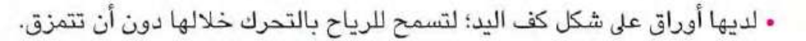
• لديها جذور عريضة وكبيرة تُسمى الجذور الداعمة، وتنمو لأعلى حول الجذوع؛ لتثبيت الشجرة بقوة في التربة الطينية.
• يبدأ طول الجذور من ٥ أمتار فوق التربة.

2 Leaves



- It has hand-shaped leaves with narrow parts.
  To allow the wind to move gently through the leaves without tearing (cutting) them.

• لديها أوراق على شكل كف اليد؛ لتسمح للرياح بالتحرك خلالها دون أن تتمزق.



It sends different messages through the wind.



- It sends its delicious-smelling flowers by wind.
- The wind carries its fluffy yellow seeds across the forest.

• **تستخدم الرياح لإرسال رسائل:**
- تنشر شجرة الكابوك عبير أزهارها.
- تحمل الرياح بذور الشجرة الصفراء الرقيقة عبر الغابة.

Give a reason for...



- In Amazon rainforests, it is hard for plants to reach sunlight.
  Because most trees in Amazon rainforests exceed 70 meters tall.

• **من الصعب على النباتات الوصول لضوء الشمس في غابات الأمازون المطيرة.**
حيث يتخطى طول معظم الأشجار ٧٠ مترًا.

Exercises on Lesson 2

1 Choose the correct answer:

1. A type of adaptation that helps the animal protect itself from enemies is ....
   a. camouflage b. extinction c. migration d. reproduction
2. Which of the following is an example for physical adaptation?
   a. Migration of birds b. Hunting at night
   c. Fur color d. Panting
3. Animals that live in a hot environment have .... ears to help them stay cool.
   a. small b. short c. long d. sharp
4. .... pant to lower their body temperature.
   a. Whales b. Penguins c. Foxes d. Bats
5. .... is (are) covering the body of the Arctic fox.
   a. Heavy hair b. Heavy skin c. Thick fur d. Many feathers
6. The fennec fox has tan-colored fur to ....
   a. reflect the sunlight b. blend in with the sand
   c. stay warm d. a and b
7. In January, the color of the Arctic fox's fur would be ....
   a. gray b. red c. white d. brown
8. Fennec foxes and Arctic foxes are common in all the following, except ....
   a. living in extreme climates b. having the same fur color
   c. eating different food d. having a strong hearing sense
9. The color of the polar bear's fur helps it to blend in with the ....
   a. rocks b. snow c. trees d. sand
10. Both agama lizards and panther chameleons are similar in ....
    a. having scales b. being reptiles
    c. living in the same habitat d. a and b

11 The panther chameleon and the .... may be found in the same habitat.
a. polar bear b. brown bear c. fennec fox d. agama lizard

12 .... have a darker color on the top and a lighter color on the belly.
a. Penguins b. Bull sharks c. Polar bears d. a and b

13 Bull sharks use a strategy called "...................." to sneak up on the prey.
a. migration b. echolocation c. panting d. countershading

14 The panther chameleon .... to scare the predators.
a. puffs up its body b. changes its color
c. opens its mouth wide d. all the previous

15 All the following can help plants to grow anywhere, except ....
a. rains b. sunlight c. their structure d. moving

16 Which example is not considered a physical adaptation of an acacia tree?
a. Its tiny leaves b. Producing poison
c. Its taproot roots d. Its long trunk

17 Both acacia trees and kapok trees have the same ....
a. habitat b. shape c. roots d. leaves

18 Kapok trees grow and survive in ....
a. Antarctica b. savannah
c. Amazon rainforests d. tundra

19 The .... keep(s) animals away from acacia trees.
a. spines b. poison c. stinky smell d. a and b

20 The .... is the only animal that can eat some leaves of an acacia tree.
a. elephant b. giraffe c. tiger d. deer

21 Acacia trees have .... leaves that grow on its top.
a. hand-shaped b. tiny c. wide d. flat

22 Bull sharks can live in ....
a. oceans b. rivers c. deserts d. a and b

23 When a panther chameleon stands on a kapok tree's seed, its color turns into ....
a. green b. yellow c. red d. white

2 Complete the following sentences from the words between the brackets:

1. The African elephant lives in a warm-climate region, so it has extra .... ears. (large - small)
2. A polar bear has .... ears than that of a caracal. (longer - shorter)
3. A/An .... fox changes the color of its fur every six months. (fennec - Arctic)
4. Animals that live in extreme cold weather habitat have .... ears. (short - long)
5. The .... fox stays in burrows at night. (fennec - Arctic)
6. Arctic foxes and fennec foxes feed on different types of food due to the .... of food. (plenty - lack)
7. The Arctic fox's fur color turns into .... when the snow melts. (white - brown)
8. The ability of the bull shark to hunt at any time is a .... adaptation. (structural - behavioral)
9. A bull shark finds more competition for finding food in .... water. (salt - fresh)
10. The eyes of the panther chameleon can move .... (separately - together)
11. A panther chameleon holds on trees' branches by its hand-like .... (feet - tail)
12. The desert lizard has colorful scales to blend in with the colorful .... (flowers - rocks)
13. A kapok tree has .... fluffy seeds. (white - yellow)
14. Acacia trees and .... have an umbrella shape. (pine trees - kapok trees)
15. An acacia tree stores water in its .... (roots - trunk)
16. An acacia tree grows in .... (Amazon forests - savannah)
17. Sending a message by an acacia tree is a .... adaptation. (structural - behavioral)
18. .... is from the difficulties facing kapok trees. (Finding water - Catching sunlight)

19 Both acacia trees and kapok trees send messages through .... (water – wind)

20 Rainforests are characterized by the .... soil. (soggy – dry)

21 .... are characterized by the dry conditions. (Amazon rainforests – Savannah grasslands)

3 Put (✓) or (✗):

1 Adaptation is necessary for the survival of all living organisms. (   )

2 The migration of birds to search for food is considered a form of behavioral adaptation. (   )

3 Animals digging trenches is a form of structural adaptation. (   )

4 Foxes have a strong sense of hearing. (   )

5 Some animals that live in cold habitats have long ears to help them keep their body temperature warm. (   )

6 The fur that some animals possess to protect them from the cold is a behavioral adaptation. (   )

7 The fennec fox has tan fur to hide in the tundra desert. (   )

8 The fennec fox pants like dogs to stay warm at night. (   )

9 Countershading strategy in bull sharks is a structural adaptation. (   )

10 All kinds of sharks live in salty water only. (   )

11 A panther chameleon puffs up its body to face any danger. (   )

12 A caracal's body is coated with tan-colored feathers. (   )

13 Plants don't need to adapt like animals to survive in their habitats. (   )

14 Production of poison in acacia trees is a behavioral adaptation. (   )

15 Plants have two types of adaptation (structural and behavioral). (   )

16 Acacia trees grow in the Amazon forest. (   )

17 Plants need long roots that extend deep into the soil to survive in the water scarcity. (   )

18 The kapok tree roots grow deeper than the acacia tree roots. (   )

19 Buttress roots grow directly downward to search for water deeply. (   )

20 Taproot roots hold the kapok tree firmly in the soggy soil. (   )

21 In dry environment, plants are adapted to store water for a long time. (   )



Write the scientific term:

1. It's a change in the behavior or act of a living organism to adapt to its environment.
2. It's a type of adaptation that includes changing some parts of the animal's body structure.
3. An aquatic animal that can hide from its enemies through countershading.
4. A desert animal that pants like a dog and has large ears to hear its prey.
5. An animal whose fur color changes as the seasons change.
6. It's a strategy of camouflage in which the animal's color is darker on top, and lighter on its belly.
7. A technique that helps dogs and fennec foxes to cool their bodies.
8. A place where both Arctic foxes and fennec foxes hide to overcome extreme climate.
9. It is a rainforest and it's characterized by its strong wind and soggy soil.
10. It is a grassland habitat that has drought conditions.
11. It's a very long root that grows directly downward in acacia trees.
12. They're wide and large roots that fix kapok trees firmly to the soggy soil.
13. It is a terrific tree that grows in the Amazon rainforests in Brazil.
14. It is a terrific tree that adapted to survive in savannah grasslands.
15. The type of adaptation when a kapok tree sends smelly messages by wind.
16. A part of the kapok tree that is supported by buttress roots.
17. A substance that is produced by an acacia tree to prevent animals from eating its leaves.

5 Cross out the odd word:

1. Taproot roots – Long trunk – Wide leaves – Produce poison
2. Kapok tree – Brown bear – Panther chameleon – Acacia tree

6 Compare between the following:

1

P. O. C.	Savannah	Amazon Rainforests
Trees	....	....
Characteristics	a. .... habitat b. .... conditions c. The temperature is	d. .... soil e. .... to find water f. .... winds

2

P. O. C.	Acacia Tree	Kapok Tree
Habitat	....	....
Shape	....	....
Roots Name	....	....
Leaves	....	....

7 Complete the following sentences using the words between the brackets:

(Arctic fox – salt water – air – structural – behavioral – independently – bull shark – fennec fox)

1. The ability of the panther chameleon to change its scales' color is a .... adaptation.
2. The panther chameleon puffing up its body with .... is considered a .... adaptation.
3. A/An .... has a countershading property to sneak up on its prey in water.
4. A/An .... has longer ears than that of the ....
5. The eyes of a panther chameleon move ....

8 Compare between the following:

P. O. C.	Fennec Fox	Arctic Fox
Habitat	....	....
Fur Color	....	....
Shape of Ears	....	....

9 Choose from column (A) what suits it in both columns (B) & (C):

Column (A)	Column (B)	Column (C)
1 Fennec fox	a. has a hump	a. to hold on branches.
2 Arctic fox	b. has sharp teeth	b. to store fats.
3 Panther chameleon	c. pants like dogs	c. to warm its body.
4 Bull shark	d. V-shaped feet	d. to tear the prey.
5 Camel	e. has short ears	e. to cool its body.

1 .... 2 .... 3 .... 4 .... 5 ....

10 Classify the following sentences by putting the letter (S) for structural adaptations and the letter (B) for behavioral adaptations:

1. Bats can hunt at night in complete darkness. ( )
2. The panther chameleon changes its scales' color on seeing an enemy. ( )
3. The migration of birds to warmer places. ( )
4. The Arctic fox stays in burrows at night. ( )
5. Humans wear heavy jackets in winter. ( )
6. Foxes have a sharp hearing sense. ( )
7. The panther chameleon puffs its body to scare predators. ( )
8. The eagle has a strong and sharp beak that helps it in ripping meat. ( )
9. The bull shark hunts in salt and fresh water. ( )
10. The bull shark lives in salt and fresh water. ( )

11 Give reasons for:

1. The fennec fox has extra-large ears, while the Arctic fox has small ears.
2. The fennec fox and the Arctic fox adapted to eat different kinds of food.
3. The bull shark has sharp teeth.
4. The bull shark has a dark back and a white belly.
5. In fresh water, a bull shark finds less competition in finding food.
6. Each eye of the panther chameleon works independently.
7. The panther chameleon has V-shaped feet and a hand-like tail.
8. The panther chameleon puffs its body and opens its mouth widely.
9. Plants can grow everywhere.
10. The acacia tree has taproots, while the kapok tree has buttress roots.
11. The acacia tree has tiny leaves and sharp spines.
12. The kapok tree has hand-shaped leaves.

12 What happens if:

1. A desert lizard stands on a yellow rock?
2. There's less food in the sea for a bull shark?
3. The bull shark had dark belly and white back?
4. The bull shark hunts during day and at night?
5. The chameleon's eyes were like the human's eyes?
6. The chameleon couldn't change its scales' colors?
7. Acacia trees have short roots?
8. A giraffe starts to eat from acacia leaves?
9. A kapok tree has wide leaves?

Lesson 3

Unit 1

Activity 7 Plant Scientist

- Botanists are the scientists who study plants and how they adapt.
- Roots, leaves, and stems are common parts of a plant.
- Plants have different-shaped leaves and various root systems to help them survive.

- علماء النبات هم العلماء الذين يدرسون النباتات وكيفية تكيُّفها.
- الجذور والأوراق والسيقان أجزاء موجودة في كل النباتات.
- للنباتات أشكال مختلفة من الأوراق وأنظمة جذور مختلفة؛ لمساعدتها في البقاء على قيد الحياة.

Examples of plants structural adaptations in dry environments:

Palm tree
Desert

- It has thick roots and narrow leaves.
To prevent the tree from being damaged in a windstorm.

- لها جذور سميكة وأوراق صغيرة
لتساعد الشجرة على الصمود أمام الرياح العاصفة.



Barbary fig
Desert

- It has sharp spines and a tough outer cover.
To prevent animals from eating its leaves and fruits.

- لها أشواك حادة وغطاء خارجي خشن
لمنع الحيوانات من أكل أوراقها أو ثمارها.



Acacia tree
Savannah

- Its branches are bunched at the top of the tree.
To prevent animals from reaching them.

- الأغصان متفرعة ومتشعبة في الجزء العلوي من الشجرة
لمنع الحيوانات من الوصول إليها.



Examples of plants structural adaptations in humid environments:

Water lily
Wetland (fresh water)

- It has wide leaves floating on the water.
  To absorb a lot of sunlight.

• لها أوراق عريضة تطفو على سطح الماء لامتصاص أكبر كمية من ضوء الشمس.



Mangrove tree
Salt water

- It has long and strong roots.
  To resist the water waves.

• لها جذور طويلة وقوية لمقاومة الأمواج.



Pine tree
Snow

- It has needles instead of leaves.
  To prevent water loss.
- It has a triangular shape, and short branches.
  So that the snow can slide easily on them without breaking the branches.

• تحتوي على إبر بدلًا من الأوراق لمنع فقدان الماء.
• لها شكل مثلث وفروع قصيرة للسماح للثلج بالانزلاق بسهولة دون كسر الفروع.



What happens if...



- A plant was placed in a different environment?

The plant would struggle to meet its needs and may not survive.

ماذا سيحدث لو: تم وضع النبات في بيئة مختلفة؟

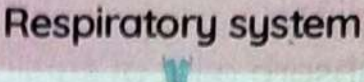
• سيكافح النبات بقوة لتلبية احتياجاته، وقد لا يعيش.

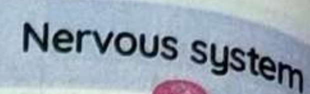
Unit 1

Activity 8 Digestive System

» The body of humans or animals is made up of systems, such as:

Digestive system











System: It is a group of organs that work together to perform a job (function

الجهاز: هو مجموعة من الأعضاء التي تعمل معًا لأداء وظيفة.

» The digestive system and respiratory system work together to get energy from food and breathing.

يعمل الجهاز الهضمي والجهاز التنفسي معًا للحصول على الطاقة من الطعام والتنفس.

Our bodies need energy to:

Do different activities.

- To move, run, walk, talk, ... etc.

Perform functions inside the body

1. The heart needs energy to beat.
2. The lungs need energy to breathe.
3. The brain needs energy to think.

Scientific Facts:

Our heart beats = 100,000 beats/day.	We breathe = 20,000 breaths/day



How do our bodies get energy from food



1. The digestive system helps our body get nutrients from food.
2. Nutrients provide our body with energy.

كيف تحصل أجسامنا على الطاقة من الغذاء؟

- يساعد الجهاز الهضمي أجسامنا على الحصول على العناصر الغذائية من الطعام.
- تزوِّد العناصر الغذائية الجسم بالطاقة.

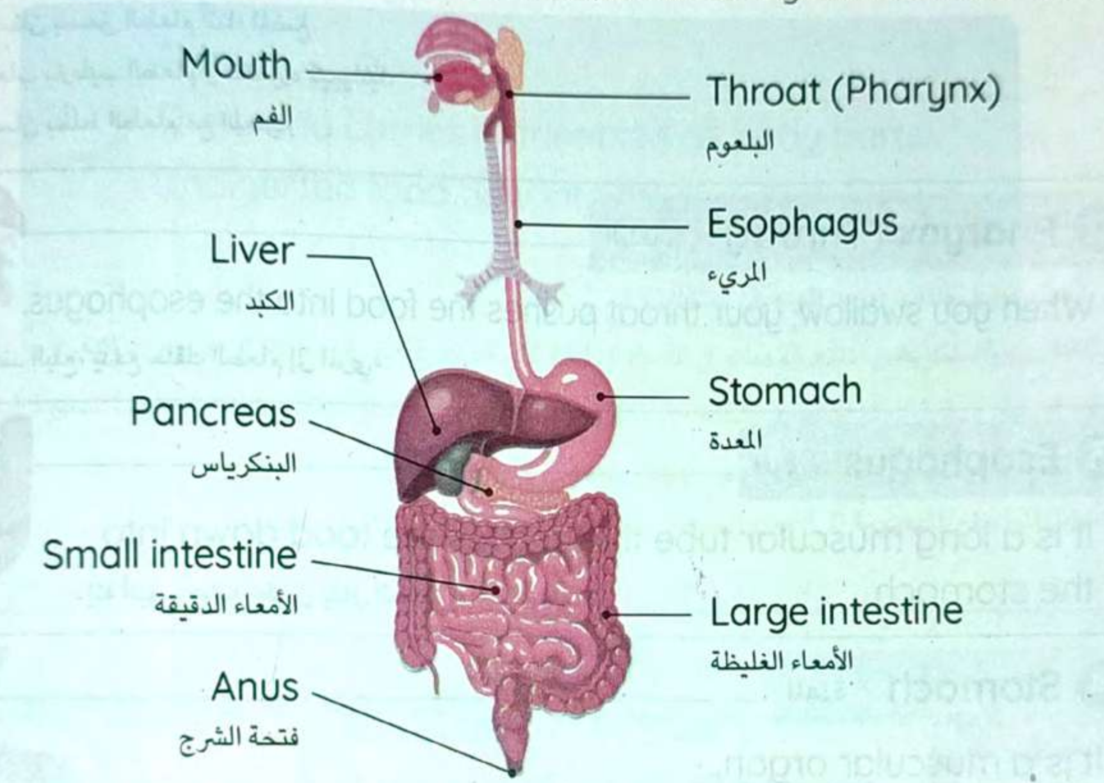
Human Digestive System

Digestion • It is the process of breaking down food into the simplest form to provide the body with nutrients.

الهضم: هو عملية تكسير الطعام إلى أبسط صورة لتزويد الجسم بالعناصر الغذائية.

Function of the digestive system:

The digestive system breaks down the food, so the body can use it for energy.



Important Note:

- The digestive system starts with the mouth and ends with the anus.

Digestion Process Pathway

Mouth → Throat → Esophagus → Stomach → Small Intestine → Large Intestine → Anus



Pancreas and liver pour their juices

Unit 1

How does the digestive system work?

1 Mouth الفم

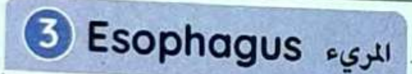
- The digestion of food starts in the **mouth**.

Teeth	• They crush (break) the food during chewing.
Saliva	• A liquid substance that moistens the food. • It breaks down the food chemically.
Tongue	• It mixes the crushed food with saliva.

- يبدأ هضم الطعام عن طريق الفم.
- تقوم الأسنان بسحق الطعام أثناء المضغ.
- يقوم اللعاب بترطيب الطعام و تكسيره كيميائيًا.
- يقوم اللسان بخلط الطعام مع اللعاب.

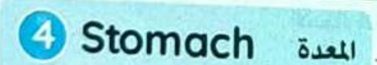
2 Pharynx (Throat) البلعوم

- When you swallow, your throat pushes the food into the esophagus.
- عند البلع، يدفع حلقك الطعام إلى المريء.

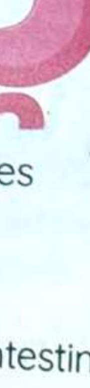


3 Esophagus المريء

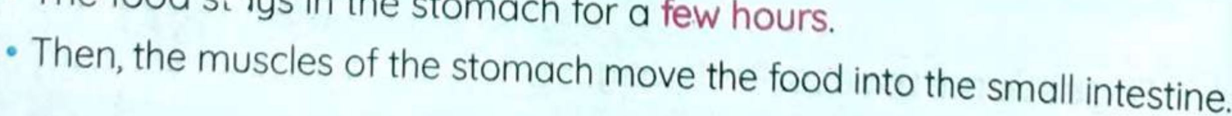
- It is a **long muscular tube** that moves the food down into the stomach.
- إنه أنبوب عضلي طويل ينقل الطعام إلى أسفل المعدة.



4 Stomach المعدة

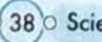


- It is a **muscular organ**.
- **Function of the stomach:**
  The stomach mixes the food with the acidic and digestive juices (enzymes) until it becomes a soupy liquid.
- The food stays in the stomach for a **few hours**.



- Then, the muscles of the stomach move the food into the small intestine.

- هي عضو عضلي.
- **وظيفة المعدة:**
  تقوم المعدة بمزج الطعام مع العصارات الحمضية والعصارة المعدية (الإنزيمات) حتى يتحول إلى سائل.
- يبقى الطعام في المعدة لبضع ساعات.
- ثم تقوم عضلات المعدة بنقل الطعام إلى الأمعاء الدقيقة.



5 Small Intestine الأمعاء الدقيقة

- It's a long, winding tube. (More than six meters long.)

Function of the liver and pancreas:

- They pour Juices into the small intestine that help break down food into nutrients.

Function of the small intestine:

- The nutrients are absorbed through the walls of the small intestine to enter into the tiny blood vessels.

Then:

- The blood carries nutrients to all body parts.
- Undigested food flow into the large intestine.

- هي أنبوب طويل ملتف. (يزيد طوله عن ستة أمتار).

وظيفة الكبد والبنكرياس: تنتج العصائر في الأمعاء الدقيقة التي تساعد في تكسير الطعام إلى عناصر غذائية.

وظيفة الأمعاء الدقيقة: يتم امتصاص العناصر الغذائية من خلال جدران الأمعاء الدقيقة لتدخل في الأوعية الدموية الدقيقة.

- يقوم الدم بحمل العناصر الغذائية إلى جميع أجزاء الجسم.
- ثم تصل المواد غير المهضومة إلى الأمعاء الغليظة.

6 Large Intestine الأمعاء الغليظة



- It's a tube that starts at the end of the small intestine and ends at the anus.

Function of the large intestine:

- It absorbs water from the undigested food, so that they become solid waste.
- Solid waste leaves the body through the anus.

- هي أنبوب يبدأ من نهاية الأمعاء الدقيقة وينتهي مع فتحة الشرج.

وظيفة الأمعاء الغليظة:

- تمتص الماء من الطعام غير المهضوم فيتحول لفضلات صُلبة.
- تخرج الفضلات الصلبة من الجسم عبر فتحة الشرج.

Unit 1

» Compare the digestion that takes place in the stomach, small intestine, and large intestine.

Stomach	Small Intestine	Large Intestine
• The stomach mixes the food with the acidic and digestive juices (enzymes) to change it into a soupy liquid.	• The food is also broken down, but unlike the stomach, the small intestine absorbs nutrients.	• The large intestine absorbs the water from the undigested food, so no digestion takes place in it.
• تقوم المعدة بمزج الطعام مع العصارات الحمضية والعصارة المعدية (الإنزيمات) لتحويله إلى سائل.	• يتفكك الطعام أيضًا ولكن على عكس المعدة، تمتص الأمعاء الدقيقة العناصر الغذائية.	• تمتص الأمعاء الغليظة الماء من الطعام غير المهضوم؛ لذلك لا يحدث هضم في الأمعاء الغليظة.

Notes:

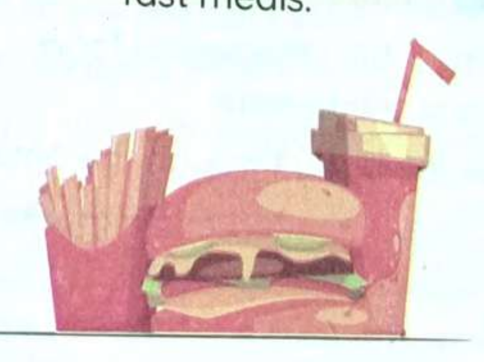
- Chewing food breaks it up mechanically.
- Saliva breaks down the food chemically.

To keep your digestive system healthy:

1. Chew the food well.



2. Do not eat fast meals.



3. Drink a large amount of water.



Activity 9 Respiratory System

» The human body needs an invisible gas called .... to survive.

carbon dioxide | hydrogen | oxygen

» Your breath quickens during .... because your body needs more air.

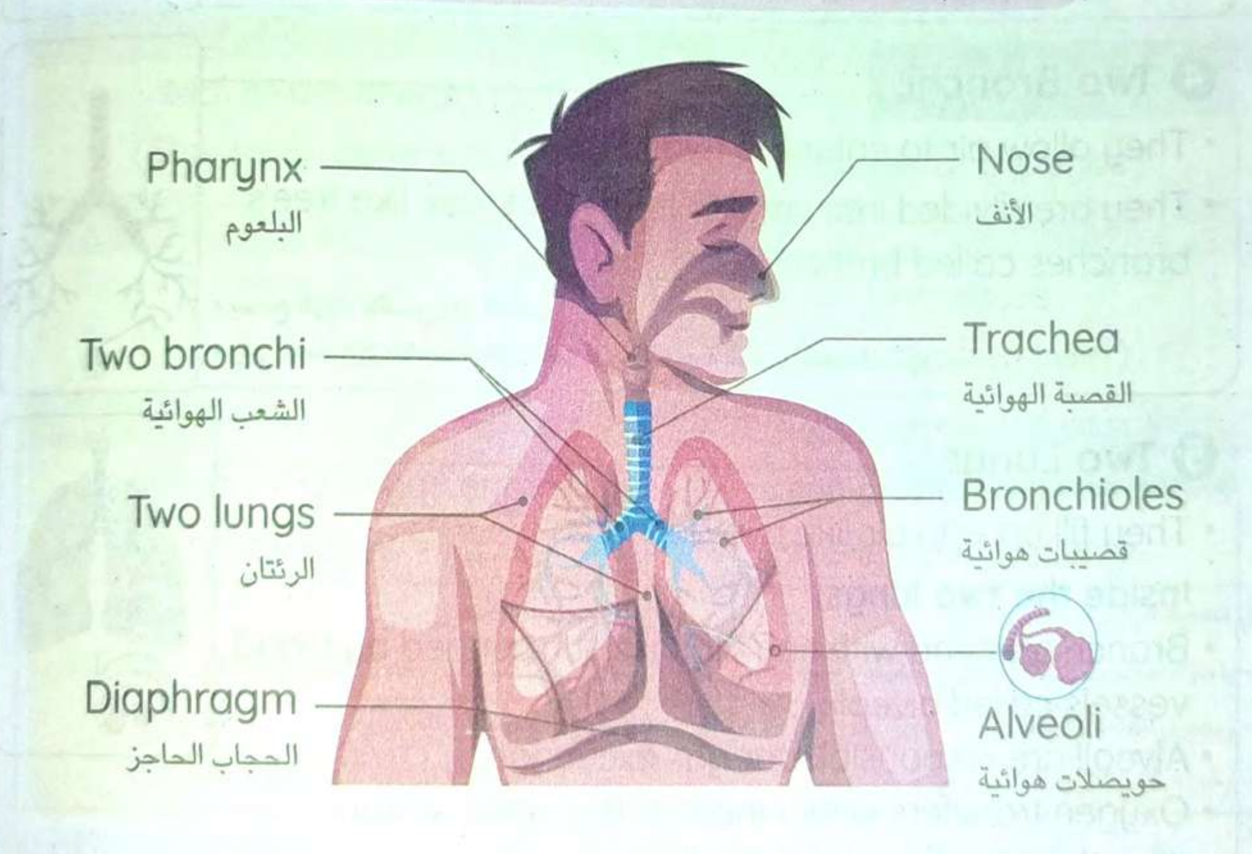
thinking | running | sleeping

Respiratory system

It is the system that is responsible for breathing (respiration).

الجهاز التنفسي: هو الجهاز المسئول عن عملية التنفس.

Human Respiratory System

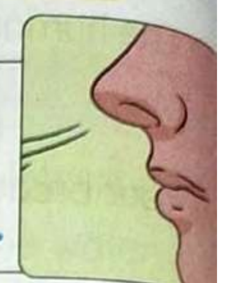


Respiratory Process Pathway

Nose → Pharynx → Trachea → Two Bronchi → Bronchioles → Alveoli

How does the respiratory system work?

1 Nose:



- It is the first organ of the respiratory system.
- Air enters the body through the nose and mouth.

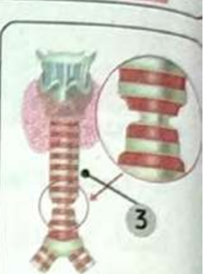
• هو أول عضو في الجهاز التنفسي. • يدخل الهواء الجسم عن طريق الأنف والفم.

2 Throat (Pharynx):



- It allows air to pass to the trachea. • يسمح للهواء بالمرور إلى القصبة الهوائية.

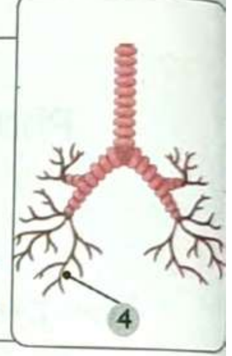
3 Trachea:



- A tube that allows air to pass to the two lungs.
- Inside the lung, it is divided into two bronchi at its end.

• أنبوب يسمح للهواء بالمرور إلى الرئتين. • داخل الرئة ينقسم إلى قصبتين في نهايته.

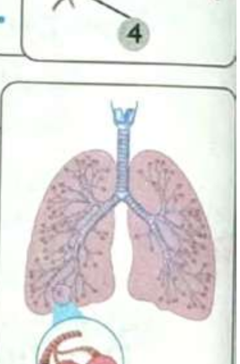
4 Two Bronchi:



- They allow air to enter the two lungs.
- They are divided into smaller tubes that look like tree's branches called bronchioles.

• يسمح للهواء بالدخول إلى الرئتين.
• وهي مقسمة إلى أنابيب أصغر تشبه فروع الشجرة تُسمى القصيبات الهوائية.

5 Two Lungs:



- They fill up with air like two balloons.

Inside the two lungs:

- Bronchioles end with tiny air sacs surrounded by blood vessels called alveoli.
- Alveoli are responsible for gas exchange.
- Oxygen transfers within them to the blood stream. then the blood carries it to all body parts.

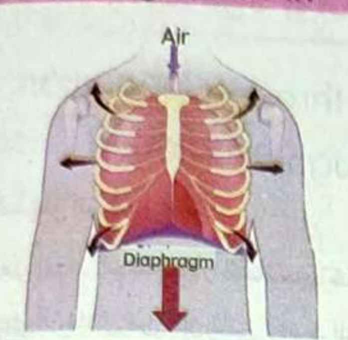
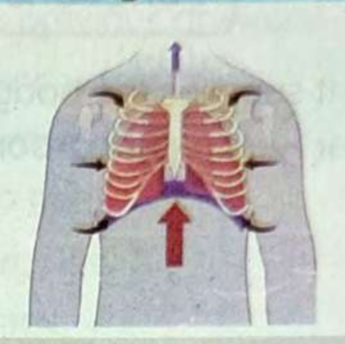
• عندما ينتقل الهواء إلى الرئتين، فإنهما تنتفخان مثل البالون.
• تنتهي الشعيبات الهوائية بأكياس صغيرة محاطة بالأوعية الدموية تُسمى الحويصلات الهوائية.
• الحويصلات الهوائية مسئولة عن عملية تبادل الغازات.
• ينتقل الأكسجين من خلال الحويصلات الهوائية لمجرى الدم الذي ينقل غاز الأكسجين إلى جميع أجزاء الجسم.

Respiration (breathing)

It's the process of inhalation "pulling the air in" and exhalation "pushing the air out".

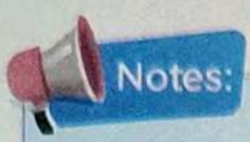
هي عملية الشهيق (سحب الهواء للداخل) والزفير (دفع الهواء للخارج).

Respiration includes

Inhalation Process "Pulling the air in"	Exhalation Process "Pushing the air out"
	
Diaphragm	
Moves downward (Shrinks or contracts)	Moves up (Relaxes or expands)
Chest Size	
Increases (Enlarges)	Decreases (Become narrower)
Type of Air	
Air rich in oxygen gas enters the lungs.	Air rich in carbon dioxide gas is expelled out the lungs.
في عملية الشهيق: • يتحرك الحجاب الحاجز لأسفل (يتقلص – ينكمش). • ويتسع القفص الصدري. • لإدخال الهواء الغني بالأكسجين إلى الرئتين.	في عملية الزفير: • يتحرك الحجاب الحاجز لأعلى (يسترخي – يتمدد). • ويضيق القفص الصدري. • لإخراج ثاني أكسيد الكربون من الرئتين.

Diaphragm:

- It's a large muscle at the base of your ribs that has an important role during inhalation and exhalation.
- عضلة كبيرة في أسفل (قاعدة) الضلوع، لها دور مهم أثناء عمليتَي الشهيق والزفير.



Notes:

- The properties of all organs in the digestive system or respiratory system are considered structural adaptations.
- The pharynx exists in both the digestive and respiratory systems.

- جميع الخصائص (الوظائف) داخل الجهاز الهضمي أو الجهاز التنفسي تعتبر تكيفات تركيبية.
- يوجد البلعوم في كلا الجهازين الهضمي والتنفسي.

Functions of the respiratory system:

1. It supplies the body with oxygen gas through inhalation.
2. It gets rid of carbon dioxide gas through exhalation.

أهمية الجهاز التنفسي:

- يعمل على إمداد الجسم بغاز الأكسجين خلال عملية الشهيق.
- يعمل على التخلص من غاز ثاني أكسيد الكربون أثناء عملية الزفير.

Give a reason for...



- Carbon dioxide gas is considered a waste material for our bodies.

Because it is a harmful gas, so our bodies expel it during exhalation.



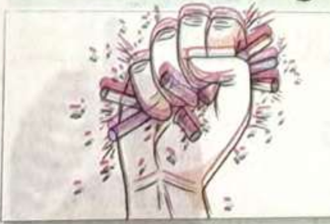
How does the respiratory system get oxygen to the body cells



1. The lungs absorb oxygen from the air that we breathe in.
2. The blood stream carries oxygen gas to all body cells.

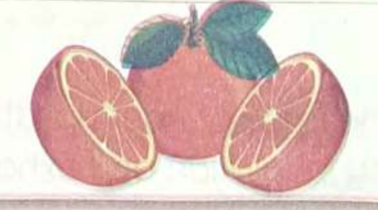
To keep your respiratory system healthy:

Avoid smoking.



تجنب التدخين.

Eat fruits rich in vitamin C.



تناول فواكه تحتوي على فيتامين C.

Breathe in clean air.



تنفس هواء نقيًا.

Exercises on Lesson 3

1 Choose the correct answer:

1. .... have sharp spines to keep the animals away.
   a. Barbary figs b. Acacia trees c. Kapok trees d. a and b
2. The roots of palm trees help them to ....
   a. stand strong against the wind b. reach the underground water
   c. fix the plant in the soil d. all the previous answers
3. Both bull sharks and .... can survive in salt water.
   a. water lilies b. mangrove trees
   c. barbary figs d. acacia trees
4. The .... may feed on the roots of barbary figs.
   a. panther chameleon b. Arctic fox
   c. fennec fox d. polar bear
5. Desert plants are characterized by ....
   a. storing water b. their tiny leaves
   c. their sharp spines d. all the previous answers
6. A pine tree has needles instead of leaves to ....
   a. prevent animals from eating it b. prevent losing water
   c. resist strong winds d. absorb sunlight
7. All of these are from the characteristics of pine trees, except ....
   a. that they have needles instead of leaves
   b. their short branches
   c. their triangular shape d. their wide leaves
8. Palm trees have .... to resist strong winds.
   a. thin roots and small leaves b. thick roots and small leaves
   c. thick roots and large leaves d. thin roots and large leaves
9. The roots of .... extend deeply to search for water.
   a. mangrove trees b. kapok trees c. water lilies d. acacia trees
10. Any system inside the body consists of a group of ....
    a. cells b. tissues c. organs d. roots

Unit 1

11 .... is (are) responsible for getting the energy from food.
a. Digestive system b. Respiratory system
c. Nervous system d. a and b

12 The food must be digested to ....
a. get the nutrients from it b. get the needed energy
c. do all the functions in the body d. all the previous answers

13 Digestion of food begins in the .... and is completed in the ....
a. mouth - small intestine b. mouth - anus
c. pharynx - anus d. stomach - small intestine

14 All these organs exist in the digestive system, except the ....
a. esophagus b. trachea c. pharynx d. liver

15 The human mouth contains all the following, except ....
a. throat b. saliva c. tongue d. teeth

16 Teeth are responsible for .... the food.
a. crushing b. swallowing c. mixing d. digesting

17 In the mouth, saliva ....
a. facilitates food swallowing b. moistens the food
c. breaks the food down chemically d. all the previous answers

18 The .... allows food to pass from the pharynx to the stomach.
a. stomach b. esophagus c. liver d. pharynx

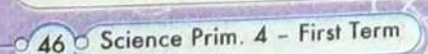
19 The stomach is a part of the digestive system that ....
a. chews food b. converts solid food into liquid
c. absorbs nutrients from food d. delivers food into the esophagus

20 In the stomach, digestion of food occurs with the help of the ....
a. enzymes b. saliva c. stomach acids d. a and c

21 The length of the small intestine is more than .... meters.
a. 10 b. 8 c. 6 d. 12

22 The large intestine absorbs .... from the undigested food.
a. fats b. water c. nutrients d. proteins

23 The .... secrete(s) juices in the small intestine to help in breaking down food into nutrients.
a. pancreas b. liver c. saliva d. a and b



24 To keep your digestive system healthy, you should do all the following, except ....
a. practicing sports regularly
b. not eating many fast meals
c. drinking more water
d. chewing the food fast

25 The gas exchange during a respiration happens inside the ....
a. mouth
b. trachea
c. lungs
d. nose

26 The diaphragm is located at the base of the ....
a. trachea
b. stomach
c. small intestine
d. ribs

27 Which organ exists in both the digestive and respiratory systems?
a. Esophagus
b. Trachea
c. Pharynx
d. Lungs

28 Inhalation means .... oxygen gas.
a. getting rid of
b. supplying the body with
c. producing
d. releasing

29 During inhalation, air in the throat reaches the two lungs through the ....
a. esophagus
b. pharynx
c. diaphragm
d. trachea

30 The two bronchi in the lungs are divided into smaller tubes called the ....
a. bronchioles
b. alveoli
c. trachea
d. blood vessels

31 The alveoli are responsible for ....
a. carrying oxygen to body parts
b. extracting oxygen from the air
c. controlling the inhalation process
d. slowing down your breathing

32 The passage of air during inhalation process is: ....
a. Nose → trachea → pharynx → lungs
b. Nose → lungs → pharynx → trachea
c. Nose → pharynx → lungs → trachea
d. Nose → pharynx → trachea → lungs

33 During inhalation, the diaphragm .... and the chest size ....
a. contracts – decreases
b. relaxes – increases
c. contracts – increases
d. relaxes - decreases

34 The .... is a muscle that plays an important role in the inhalation and exhalation processes.
a. esophagus
b. alveoli
c. lungs
d. diaphragm

35 The .... prevent the plant's leaves from losing water.
a. flat leaves
b. tiny leaves
c. wide leaves
d. a and b

Concept 1

Unit 1

2 Complete the following sentences from the words between the brackets:

1. Pine trees have a/an .... shape. (umbrella - triangular)
2. A water lily has .... leaves to absorb sunlight. (narrow - wide)
3. .... grow in fresh water. (Mangrove trees - Water lilies)
4. If a pine tree has .... branches, the snow won't slide down on them. (short - long)
5. A kapok tree has .... fluffy seeds. (white - yellow)
6. The .... mix and grind the food inside the mouth. (teeth and throat - teeth and tongue)
7. A tube with muscles that help in pushing the food into the stomach is called .... (trachea - esophagus)
8. The .... is the longest organ in the digestive system. (small intestine - large intestine)
9. Nutrients are absorbed in the .... (stomach - small intestine)
10. Undigested food passes from the small intestine to the .... (blood - large intestine)
11. Food waste is ejected outside the body through the .... (small intestine - anus)
12. The liver and pancreas secrete their juices in the .... (stomach - small intestine)
13. In the large intestine, ... is (are) absorbed from food waste. (water - nutrients)
14. Nutrients are carried by the .... from the small intestine to all body parts. (liver - blood)
15. The digestive system ends with the .... (anus - mouth)
16. During respiration, ... gas is considered a waste product. (oxygen - carbon dioxide)
17. During exhalation, ... gas comes out of the lungs. (oxygen - carbon dioxide)
18. Your breath rate increases during .... (sitting - running)
19. The lungs are one of the important organs in the .... system. (respiratory - digestive)

20 The diaphragm rises up during the .... process. (inhalation - exhalation)

21 During exhalation, the diaphragm muscle .... (expands - contracts)

22 Oxygen gas passes from the two lungs to all body parts through the .... (diaphragm - blood)

23 The trachea is divided into two .... in each lung. (bronchi - bronchioles)

24 In the lungs, the alveoli are surrounded by .... (blood vessels - bronchioles)

25 During inhalation, the size of the chest .... (gets narrow - enlarges)

26 Lungs → trachea → pharynx → nose, is the passage of air when you .... (inhale - exhale)

27 The .... precedes the trachea in the human respiratory system. (nose - pharynx)

28 The .... protect(s) your lungs. (ribs - diaphragm)

29 Gases exchange occurs in the .... (alveoli - bronchioles)

30 The .... connects your throat to the lungs. (esophagus - trachea)

3 Put (✓) or (✗):

1 The pine tree may exist in the same habitat of the polar bear. ( )

2 The water lily has wide leaves to absorb big amounts of water. ( )

3 Barbary figs and palm trees are adapted to live in extreme cold weather. ( )

4 Each organ inside the human body consists of a group of systems. ( )

5 The digestion of food begins in the mouth. ( )

6 Saliva is a solid substance that is secreted in the mouth. ( )

7 During swallowing, food is pushed by the pharynx to the stomach. ( )

8 Food turns from a complex form into a simpler one during digestion. ( )

9 The stomach is a long muscular tube that secretes juices. ( )

10 The large intestine starts from the end of the small intestine. ( )

11 Eating much fast food makes your digestive system unhealthy. ( )

12 The undigested food is stored in the small intestine to get rid of it. ( )

13 The respiratory system is responsible for the entry of air into your body. ( )

14 When running and making an effort, the number of breathing times decreases. ( )

15 Exhaled air is loaded with oxygen. ( )

16 Carbon dioxide gas passes from the trachea to the two lungs. ( )

17 When the diaphragm contracts, carbon dioxide gas is expelled outside the body. ( )

18 In the lungs, bronchioles end with alveoli. ( )

19 The paths of oxygen and carbon dioxide are in the same direction through the respiratory system. ( )

20 Respiration process includes inhalation process only. ( )

21 Gases exchange occurs in the alveoli. ( )

4 Write the scientific term:

1 A plant that adapted to survive in snow and has a triangular shape.

2 A plant that has wide leaves floating in the water to absorb sunlight.

3 A tree that grows in salty water and has strong and long roots.

4 A part of pine trees that prevents the loss of water.

5 The process of breaking down food into small pieces to get nutrients from them.

6 The system that breaks food into small parts to get energy.

7 The organ in which absorption of digested food occurs.

8 The organ where digestion of food begins.

9 A liquid that facilitates the swallowing of food.

10 A muscular organ where food stays for a few hours to be in a soupy liquid form.

11 A long muscular tube that moves the food into the stomach.

12 The organ where water is absorbed from the undigested food.

13 The organ where nutrients is absorbed through the blood vessels.

14 A long winding tube that is more than 6 meters long.

15 A process by which the air carrying oxygen gas enters into the body.

16 They're air sacs existing in the two lungs that extract oxygen gas from the air.

17 A muscle that helps your lungs pull in the air and push it out.

18 They are smaller branches of the bronchi.

19 It's a common passage for both food and air in the human body.

5 Cross out the odd word:

1 Palm tree - Barbary fig - Acacia tree - Kapok tree

2 Barbary fig - Palm tree - Polar bear - Fennec fox

3 Pine tree - Arctic fox - Mangrove tree - Polar bear

4 Pharynx - Stomach - Liver - Trachea

5 Pharynx - Lungs - Stomach - Trachea

6 Throat - Teeth - Saliva - Tongue

7 Diaphragm contracts - Chest size increases - Inhalation - Exhalation

6 Complete the following sentences using the words between the brackets:

(alveoli - esophagus - trachea - carbon dioxide - energy - teeth - blood vessels - oxygen - tongue)

1 In the human body, food is burned by .... gas to get the needed ....

2 The .... crush food during chewing, while the .... mixes the food with saliva.

3 Food passes from the throat to the ...., but air passes from the throat to the ....

4 Lungs contain air sacs called .... that are surrounded by ....

Unit 1

7 Compare between the following:

1

P.O.C.	Palm Tree	Mangrove Tree
Habitat	....	....
Roots Shape	....	....

2

P.O.C.	Water Lily	Acacia Tree
Habitat	....	....
Leaves Shape	....	....

3

Respiratory System	Inhalation	Exhalation
Diaphragm	....	....
Chest Size	....	....
Air Rich in	....	....

8 Classify the following organs according to the system they belong to:

Pharynx - Diaphragm - Stomach - Trachea - Anus
Nose - Tongue - Lungs - Alveoli - Small intestine

Digestive System	Respiratory System	Both Systems
....	....	....
....	....	....

9 Choose from column (A) what suits it in both columns (B) & (C):

Column (A)	Column (B)	Column (C)
1 Kapok tree	a. lives in savannah.	a. has needle leaves.
2 Pine tree	b. lives in Amazon rainforests.	b. has wide leaves.
3 Water lily	c. lives in the desert.	c. has strong roots to resist water waves.
4 Acacia tree	d. lives in the snow.	d. has hand-shaped leaves.
	e. lives in wetlands.	e. has tiny leaves.



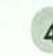
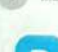
1 .... 2 .... 3 .... 4 ....

10 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Esophagus	a. facilitates swallowing food.
2 Teeth	b. completes the digestion of food and absorbs nutrients.
3 Saliva	c. is a muscular organ where the acidic juice is secreted.
4 Small intestine	d. moves the food down into the stomach.
5 Large intestine	e. starts from the end of the small intestine and ends with the anus.
6 Stomach	f. break and crush food during chewing.

1 .... 2 .... 3 .... 4 .... 5 .... 6 ....


B

Column (A)	Column (B)
1 Nose	a. extract oxygen gas from the air.
2 Lungs	b. carries oxygen gas to all body parts.
3 Blood	c. Air enters the body through it.
4 Alveoli	d. are like two balloons.




1 .... 2 .... 3 .... 4 ....

Unit 1

11 Determine the type of adaptation in the following sentences:

	Structural	Behavioral
1 Taproot roots in acacia trees		
2 Acacia trees produce poison.		
3 Barbary figs have spines.		
4 The hand-shaped leaves of kapok trees.		
5 The triangular shape of the pine tree		

12 Study the following figures, then answer the questions below:

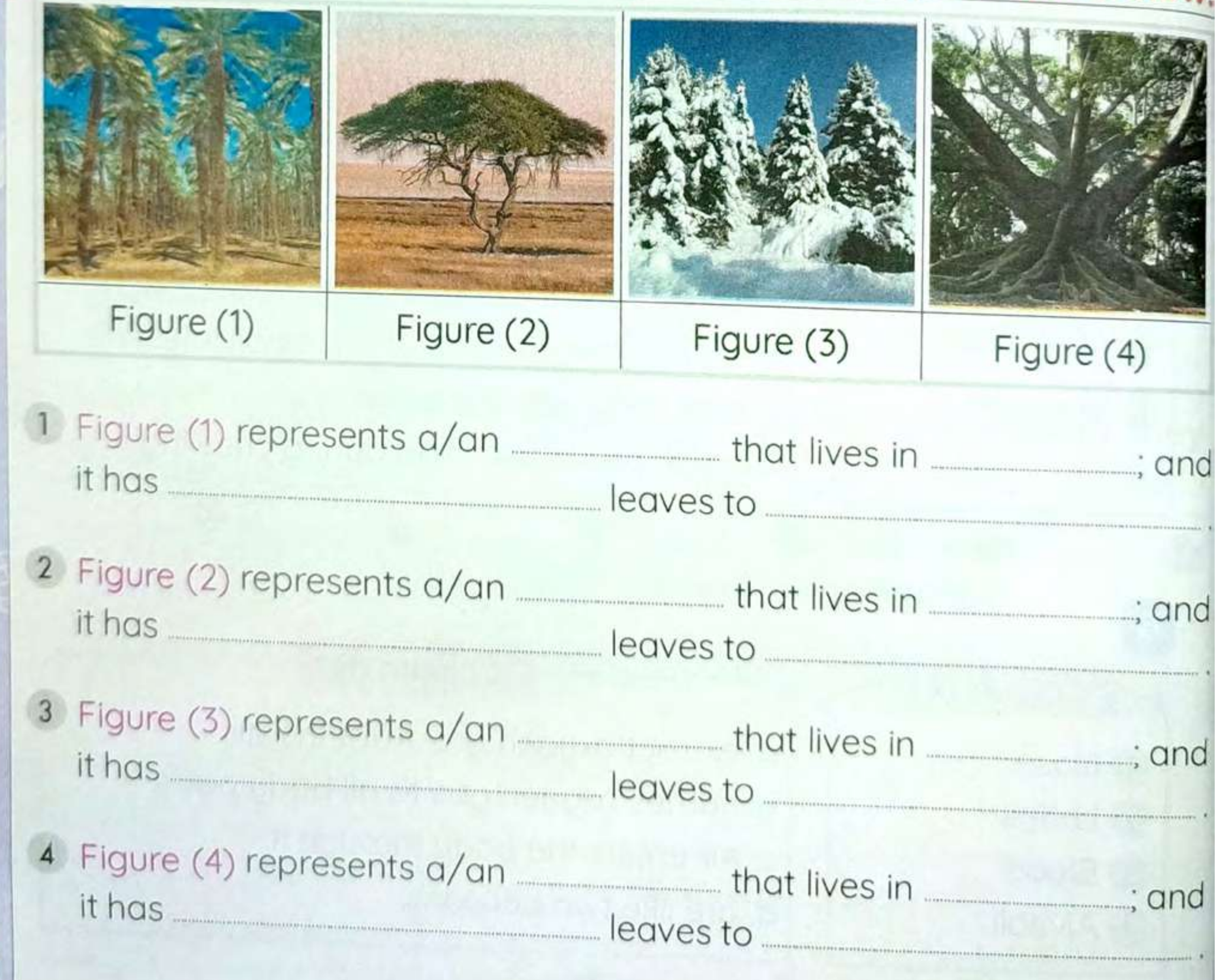


Figure (1)	Figure (2)	Figure (3)	Figure (4)

1. Figure (1) represents a/an .... that lives in ....; and it has .... leaves to ....
2. Figure (2) represents a/an .... that lives in ....; and it has .... leaves to ....
3. Figure (3) represents a/an .... that lives in ....; and it has .... leaves to ....
4. Figure (4) represents a/an .... that lives in ....; and it has .... leaves to ....

13 Label the following figures:

Figure (A):

1 .... 2 ....

3 .... 4 ....

5 .... 6 ....

7 ....

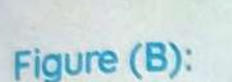
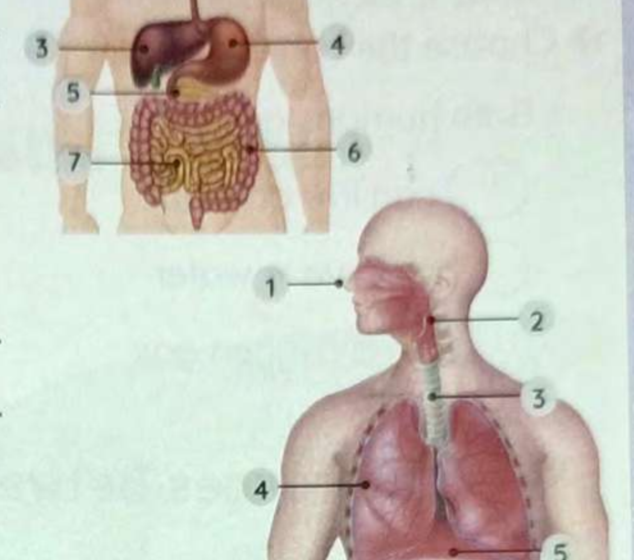


Figure (B):



1 .... 2 ....

3 .... 4 ....

5 ....

14 Give reasons for:

1. The water lily has wide leaves floating on the water.
2. The palm tree has thick roots and small leaves.
3. The pine tree has a triangular shape and short branches.
4. Humans need food to do different activities.
5. Teeth, tongue and saliva have great functions.
6. The pancreas and liver help in the digestion process.
7. The diaphragm helps in the respiration process.
8. We should avoid smoking and eat fruits rich in vitamin C.
9. We should eat healthy food and avoid fast meals.

15 What happens if:

1. A palm tree has thin, weak roots?
2. A pine tree has an umbrella shape?
3. There is no saliva in the mouth?
4. We eat a lot of fast meals?
5. The diaphragm relaxes during exhalation?

Lesson 4

Unit 1

Activity 10 How Fish Breathe

» Choose the correct answer:

- Both humans and fish ....

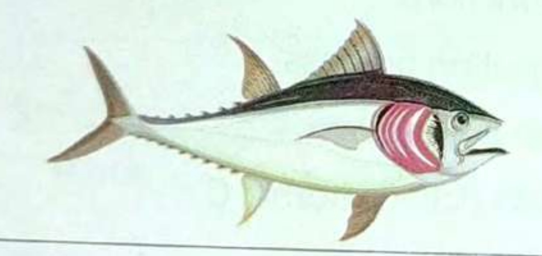
◯ can live on land

◯ can live in water

◯ need oxygen gas



Differences Between Humans and Fish

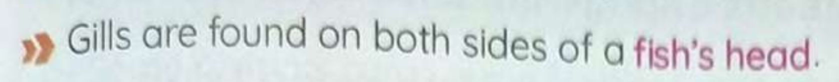
Fish	Humans
Fish have gills to inhale oxygen gas from water.	Humans have two lungs to inhale oxygen gas from air.
تمتلك السمكة خياشيم لاستخلاص الأكسجين من الماء.	يمتلك الإنسان رئتين لاستخلاص الأكسجين من الهواء.
	

Similarities Between Humans and Fish

- Both of them take in oxygen gas and release carbon dioxide gas.
- Blood carries oxygen gas to all body parts.

• كلاهما يستنشق غاز الأكسجين ويُخرج ثاني أكسيد الكربون.

• يقوم الدم بنقل غاز الأكسجين لجميع أجزاء الجسم.



- Fish have gills (unique structure) to allow them to breathe underwater.
- Gills are found on both sides of a fish's head.

- تمتلك الأسماك خياشيم لتساعدها على التنفس تحت الماء.
- تقع الخياشيم على جانبَي رأس السَّمكة.

How do fish breathe in water?

1. Water enters the mouth of a fish and passes across the gills.

- تدخل المياه من فم السمكة وتمر من خلال الخياشيم.

2. The blood vessels in the gills carry oxygen gas to all body parts and release carbon dioxide gas.

- تقوم الأوعية الدموية بحمل الأكسجين إلى جميع أجزاء الجسم والتخلص من غاز ثاني أكسيد الكربون.



Note:

- Fish need clean water to survive, just as humans need to breathe clean air.

- تحتاج السمكة إلى ماء نظيف للبقاء، كما يحتاج الإنسان لتنفس هواء نقي.





Activity 11 Humans Change the Environment

- Some environmental changes are caused by human activities.
- Human activities may cause the disappearance of plants and animals that once lived in this ecosystem.

حدث بعض التغيرات البيئية بفعل الأنشطة البشرية.

تتسبب الأنشطة البشرية في اختفاء أنواع من النباتات والحيوانات التي كانت جزءًا من النظام البيئي.

Examples of Some Human Activities



1 Cutting down forests

• قطع الأشجار في الغابات.



2 Plowing grasslands or clearing lands

• تجريف التربة أو تسوية الأرض.



3 Building communities

• بناء المدن بدلًا من الأرض الزراعية.



4 **Air pollution:**
- Cars exhausts
- Factory pollution

• تلوث الهواء
بسبب عوادم السيارات والمصانع.



5 **Water pollution or soil pollution:** Dumping waste to waterways and soil

• تلوث المياه أو تلوث التربة
بسبب إلقاء النفايات في المجاري المائية أو التربة.



6 Introducing plants and animals to an ecosystem that they were never a part of

• وضع حيوانات أو نباتات في بيئة مختلفة عن بيئتها الأصلية.

When the air, water, or soil in an area is polluted,

- Some animals can survive by moving to another ecosystem to find what they need.
- Plants must rely on their seeds landing in a better place for them to survive and grow.

- يمكن لبعض الحيوانات البقاء على قيد الحياة بالانتقال إلى نظام بيئي آخر للعثور على ما تحتاجه.
- تعتمد النباتات على هبوط بذورها في مكان أفضل للبقاء على قيد الحياة.

Human are also affected by pollution, as:

1 Air Pollution (Smog)	2 Water Pollution	3 Soil Pollution
It makes it hard for humans to breathe.	It makes it hard for humans to find clean drinking water.	It makes the crops not grow.
تلوث الهواء: مما يؤدي لصعوبة التنفس للإنسان.	**تلوث الماء:** مما يؤدي لعدم وجود مياه شرب نظيفة.	**تلوث التربة:** يؤدي لعدم نمو المحاصيل.

People living in cities are exposed to a high level of air pollution that causes:



Lung damage	Asthma	Heart problems
تدمير الرئتين	الربو	أزمات قلبية

The role of humans to help restore the ecosystem:

1 Replanting cleared forests.
2 Removing air and water pollutants.
3 Preserving native plants and animals

1 إعادة زراعة الغابات التي أُزيلت. 2 التخلص من ملوثات الماء والهواء. 3 الحفاظ على الحيوانات والنباتات الأصلية.

Exercises on Lesson 4

1 Choose the correct answer:

1. Fish extract oxygen gas from the water by their ....
   a. skin b. gills c. lungs d. fins
2. Unlike humans, fish don't breathe underwater using their ....
   a. skin b. gills c. lungs d. paddles
3. As fish need clean water to breathe, humans need .... to drink.
   a. clear air b. polluted air c. clean water d. polluted water
4. Both humans and fish .... to survive.
   a. need clean water to breathe b. inhale oxygen gas
   c. inhale carbon dioxide gas d. exhale oxygen gas
5. Gills are found on both sides of a fish's .... under its bony flaps
   a. tail b. eye c. head d. paddles
6. Humans can help in restoring the ecosystem by ....
   a. plowing grasslands b. replanting cleared forests
   c. cutting down trees d. throwing wastes in water
7. By increasing the levels of air pollution, people may suffer from ....
   a. lung damage b. heart problems c. asthma d. all the previous
8. .... pollution makes it hard for humans to breathe.
   a. Air b. Water c. Soil d. Noise
9. What happens to living things that can't adapt to the conditions of their environment?
   a. Their number increases. b. They can't stay in the environment.
   c. Their number is kept constant.
   d. They can survive in the environment.

2 Complete the following sentences from the words between the brackets:

1. .... gas is expelled out the fish into the water.
   (Oxygen - Carbon dioxide)
2. Both human's lungs and fish's gills are .... adaptations.
   (behavioral - structural)

3 Oxygen gas is extracted from water through a fish's ....
(gills - mouth)

4 Carbon dioxide gas is released from a fish's .... into the water.
(gills - mouth)

5 Watering plants with polluted water may cause .... pollution.
(soil - air)

6 Plants depend on their .... to be planted in a better place to survive.
(leaves - seeds)

7 .... pollution makes it hard for humans to find drinkable water.
(Soil - Water)

8 In fish, the blood vessels carry oxygen from the .... to all body parts.
(lungs - gills)

9 .... pollution affects fish health. (Water - Air)

10 Humans can replant removed forests to .... the ecosystem.
(damage - restore)

11 Human activities have a .... effect on the ecosystem.
(positive - negative)

3 Put (✓) or (✗):

1 Gills are found at only one side of a fish's head. ( )
2 Fish have gills to expel oxygen underwater. ( )
3 Both humans and fish need clean water to survive. ( )
4 People living in cities are exposed to a high level of air pollution. ( )
5 Asthma is caused by water pollution. ( )
6 Man cannot restore the ecosystem in any way. ( )

4 Complete the following sentences using the words between the brackets:

(lungs - asthma - Smog - air - blood vessels)

1 In fish, gills have .... to carry oxygen to all body parts.
2 Birds have .... to respire oxygen gas from the ....
3 .... harms the human respiratory system and causes ....

5 Cross out the odd word:

1. Gills - Alveoli - lungs - Trachea
2. Lung damage - Asthma - Dying crops - Heart problems

6 Write the scientific term:

1. The organ that helps humans to respire.
2. A unique structure that helps fish to extract oxygen from water.
3. They carry oxygen gas to all body parts of a fish.
4. The gas that humans and fish need to survive.
5. The gas released from the gills of fish into water.

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Lungs	a. is carried by blood to all body parts.
2 Gills	b. carry oxygen to all body parts of the fish.
3 Blood	c. is exhaled by humans and animals.
4 Oxygen gas	d. allow humans to extract oxygen from the air.
5 Carbon dioxide gas	e. allow fish to survive underwater.

1 .... 2 .... 3 .... 4 .... 5 ....

8 Mention two ways for humans to restore the ecosystem:

1 .... 2 ....

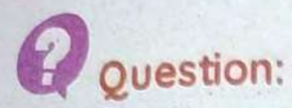
9 Give reasons for:

1. Humans have lungs, while fish have gills.
2. Human activities are dangerous to the environment.
3. Some people living in cities are affected by lung damage.
4. Exhausts of cars and factories cause breathing problems.

10 What happens if:

1. Humans have gills like fish?
2. Car and factories exhausts level increases. (concerning the impact on human's health)?
3. The air pollution increases (concerning the respiratory system)?

Lesson 5



Activity 12 Record Evidence Like a Scientist: Penguin



- You have learned a lot about adaptation in living organisms.
- Now, act like a scientist and try to answer the following question.



Question:

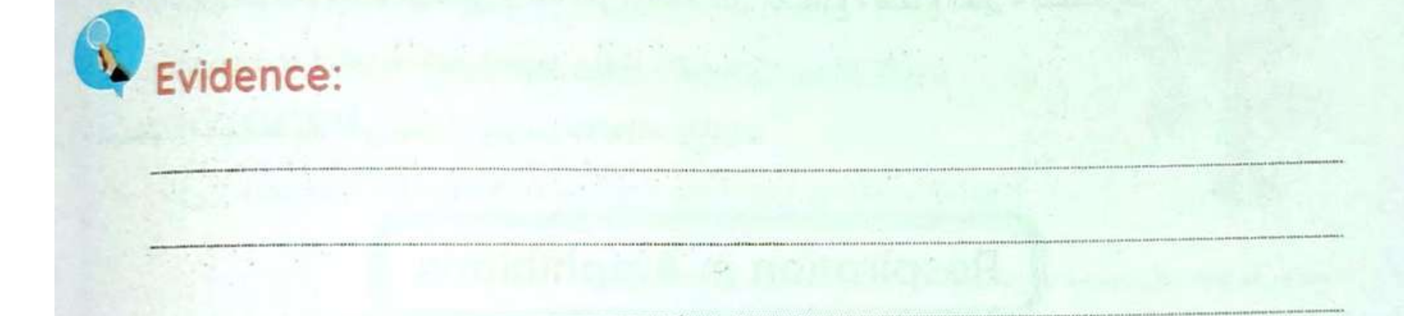
- How do different types of animals and plants adapt to survive in extreme climates?

My Claim:

____

____

____

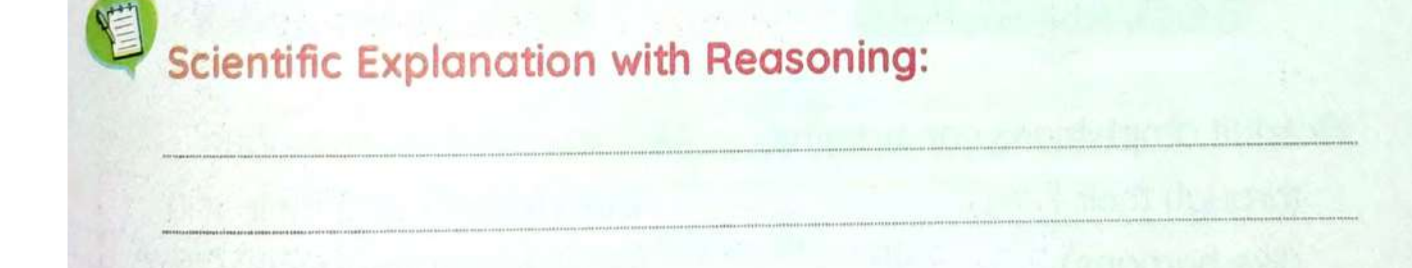


Evidence:

____

____

____



Scientific Explanation with Reasoning:

____

____

____

____

____

STEM in Action

Activity 13 Careers and Adaptation

Amphibians البرمائيات

- They are animals that live in water and on land, such as:

Frogs



Toads



Salamanders



- They can live in moist (wet) environments, such as: rainforests, streams and ponds.
- Amphibians are covered with skin that water and gases can pass through.

• البرمائيات هي حيوانات يمكنها أن تعيش في الماء وعلى اليابسة، مثل: الضفادع - ضفدع الطين - السلمندرات.

• تعيش في البيئات الرطبة (الغابات المطيرة - مجرى المياه - البِرَك).

• البرمائيات مغطاة بالجلد الذي يمكن أن يمر من خلاله الماء والغازات.

Respiration in Amphibians

On Land

- Adult amphibians can breathe through their lungs (like humans).

• تستطيع التنفس من خلال الرئتين كالإنسان.

In Water

- They can take in oxygen from water using their skin. (Structural Adaptation)

• تستطيع أيضًا استخلاص الأكسجين من المياه عن طريق الجلد (تكيف تركيبي).

- Amphibians need clean water to stay healthy.
- Amphibians are very sensitive to any environmental pollution, such as:

1. Air pollution
2. Water pollution (Viruses in water)




- تحتاج البرمائيات إلى مياه نظيفة لتظل بصحة جيدة.
- البرمائيات حساسة للغاية لأي تلوث بيئي، مثل:

1 تلوث الهواء 2 تلوث الماء (الفيروسات في المياه)

90 species	124 species
They became extinct in the last 20 years. • يوجد ٩٠ فصيلة انقرضت آخر ٢٠ عامًا.	They are endangered. • يوجد ١٢٤ فصيلة معرضة للانقراض.

The role of scientists to protect amphibians from extinction

- Scientists are working to save ampibians from extinction by studying:
  - How amphibians adapt and interact with their environment.
  - What makes amphibians sick in their environment.



- **يعمل العلماء على حماية البرمائيات من الانقراض عن طريق دراسة:**
  - كيفية تكيُّف وتفاعل البرمائيات مع البيئة المحيطة.
  - ما يصيب البرمائيات بالضعف في بيئتهم.

Protecting Amphibians from Extinction

1. Avoid throwing waste materials into the water.
2. Get rid of the chemicals in a correct way to avoid water pollution.

- **حماية البرمائيات من الانقراض:**

1. تجنُّب إلقاء المخلفات في المياه.
2. التخلص من الكيماويات بطريقة صحيحة لتجنب تلوث المياه.

Exercises on Lesson 5

1 Choose the correct answer:

1. .... need clean water to survive.
   a. Humans b. Fish c. Frogs d. a, b and c
2. Frogs can respire in water using their ....
   a. lungs b. gills c. skin d. a and c
3. A frog may stand on the leaf of a/an ....
   a. acacia tree b. palm tree c. water lily d. barbary fig
4. A frog could be a prey for ....
   a. agama lizards b. fennec foxes
   c. caracals d. panther chameleons
5. When the number of a species becomes zero, that species is ....
   a. endemic b. endangered c. extinct d. vulnerable
6. Frogs, toads and salamanders belong to ....
   a. reptiles b. birds c. mammals d. amphibians
7. Both .... and .... can survive on land.
   a. fish – humans b. frogs – humans
   c. frogs – fish d. fish – birds
8. .... species are organisms whose population have reduced.
   a. Extinct b. Endangered c. Survived d. Safe
9. Frogs, fish and humans ....
   a. extract oxygen from water b. can respire through their lungs
   c. can respire through their skin d. inhale oxygen gas
10. To protect amphibians from extinction, we must ....
    a. throw wastes in water and air
    b. transfer frogs to the desert
    c. dispose of chemicals in the correct way
    d. destroy their natural habitat

2 Complete the following sentences from the words between the brackets:

1. The ability of a frog to extract oxygen by its skin is a .... adaptation. (structural - behavioral)
2. Amphibians could exist in .... (deserts - rainforests)
3. Adult frogs rely on their .... to respire on land. (skin - lungs)
4. .... can survive on land only. (Humans - Toads)
5. Salamander is considered a/an .... (fish - amphibian)
6. Amphibians' bodies are covered with .... (skin - scales)
7. As pollution levels increase, the number of endangered species in an ecosystem .... (increases - decreases)
8. The .... season is very dangerous for amphibians. (dry - rainy)
9. The presence of .... in water causes amphibians extinction. (oxygen gas - viruses)

3 Put (✓) or (✗):

1. Amphibians use their gills to breathe in water like fish. ( )
2. Frogs and toads are considered reptiles that live in rainforests. ( )
3. Adult frogs respire by both their lungs and skin. ( )
4. Both amphibians and humans can survive out of the water. ( )
5. The skin of a frog must be dry to survive. ( )
6. We must dispose of chemicals in the correct way to avoid water pollution. ( )
7. The number of amphibians increases with increasing pollution. ( )
8. Amphibians are very sensitive to any environmental pollution. ( )

4 Complete the following sentences using the words between the brackets:

(gills - Salamanders - water - air - lungs - skin)

1. .... have two breathing methods.
2. On land, a toad uses its .... to get oxygen from the ....
3. Fish uses their .... to get oxygen gas from the ....

Unit 1

5 Cross out the odd word:

1. Frogs - Salamanders - Fish - Toads
2. Kapok tree - Palm tree - Frogs - Panther chameleons

6 Write the scientific term:

1. They're small animals that live in moist environments.
2. It's the gas needed for respiration for animals and humans.
3. It's the organ that allows frogs to breathe underwater.
4. It's the organ that allows frogs to breathe on land.
5. It's the species that has a great loss in the number of its members.

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Amphibians	a. can survive on land only.
2 Fish	b. can survive underwater and on land.
3 Humans	c. can survive underwater only.

1 .... 2 .... 3 ....

8 Give reasons for:

1. Scientists learn a lot about how amphibians adapt.

   ....

2. Amphibians can live on land or underwater.

   ....

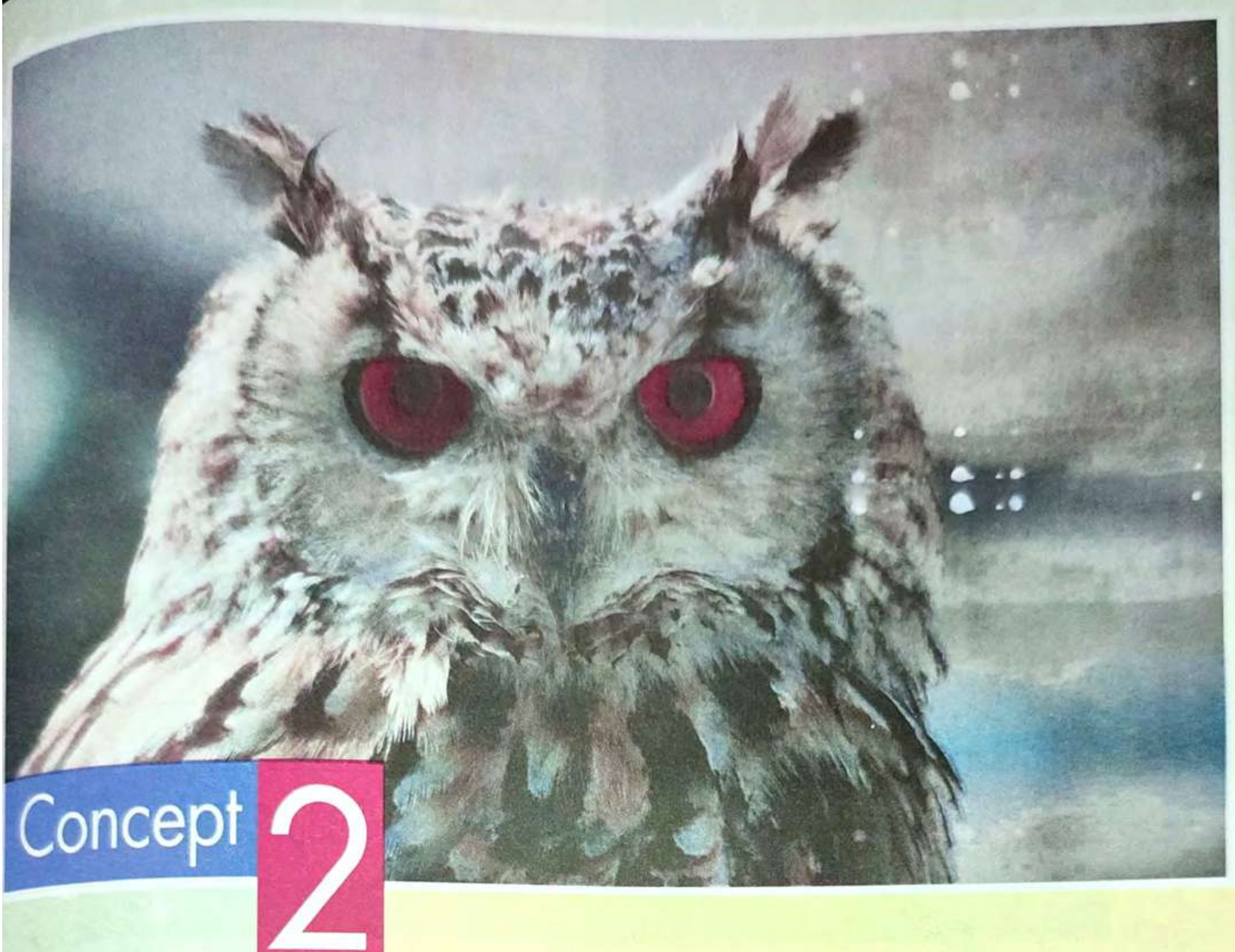
3. Amphibians can't survive in the savannah.

   ....

9 What happens if:

- Water pollution increases (concerning amphibians)?

  ....



Concept 2

Senses at Work

Concept Objectives:

By the end of this concept, students will learn about:

- Dolphin super senses.
- Super sensory organs in some animals.
- Nocturnal animals.
- The nervous system and how does it work.

Key Vocabulary:

- Brain
- Reflex
- Senses
- Information
- Nerve
- Sound
- Receptor

Concept 2

Senses at Work

Lesson 1	
Activity 1	Can you explain?
Activity 2	Dolphin Senses
Activity 3	What Do You Already Know About Senses at Work?

Lesson 2	
Activity 4	Senses of Nocturnal Animals
Activity 5	The Nervous System
Activity 6	Sensing the Environment

Lesson 3	
Activity 7	How the Nervous System Works
Activity 8	Describing the Nervous System

Lesson 4	
Activity 9	How Animals Use Communication Systems
Activity 10	Technology Inspired by Nature

Lesson 1

Activity 1 Can You Explain?

» Animals, like humans, can sense their environments with their sense organs, such as:

1 Using their eyes to see. 2 Using their ears to hear.

• الحيوانات مثل الإنسان يمكن أن تستشعر المعلومات وتعالجها بأعضائها الحسية، مثل:

1 استخدام العينين للرؤية. 2 استخدام الأذنين للسمع.

Egyptian Mongoose

Egyptian mongooses produce sounds that seem like chatter. 

• To communicate and move to search for food.



• تُصدر حيوانات النمس أصواتًا تبدو مثل الثرثرة للتواصل سويًا من أجل التحرك والبحث عن الغذاء.

» Animals have senses sharper than humans' to:

Search for food.	Protect themselves.	Communicate together.

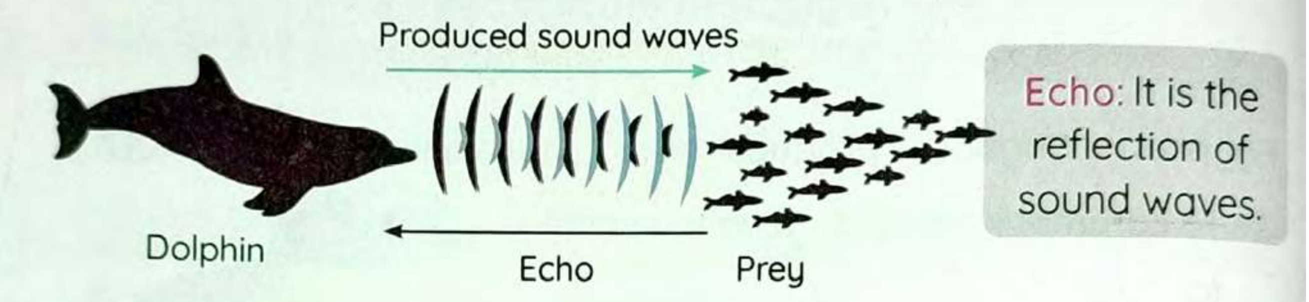
Activity 2 Dolphin Senses

- We use our sense of hearing to gather information about what is happening around us.
- Some animals seem to have super senses that help them survive.

Dolphins' super senses

- To survive in dark, murky waters, dolphins use the sense of echolocation which depends on echo to:

1. Find food.
2. Protect themselves.



Echo: It is the reflection of sound waves.

1. Dolphins produce sound waves through the water.
2. When these waves hit any object, they return to the dolphins in the form of an echo.
3. Echo helps dolphins locate their prey and other objects.

- تقوم الدلافين بإرسال موجات صوتية عبر المياه.
- عندما ترتطم الموجات بأي جسم فإنها ترتد إلى الدلافين في صورة صدى الصوت.
- يساعد صدى الصوت الدلافين على تحديد موقع الفرائس أو الأجسام في المياه.

Science Facts



Dolphins have a sharp hearing sense that allows them to hear all kinds of sounds.



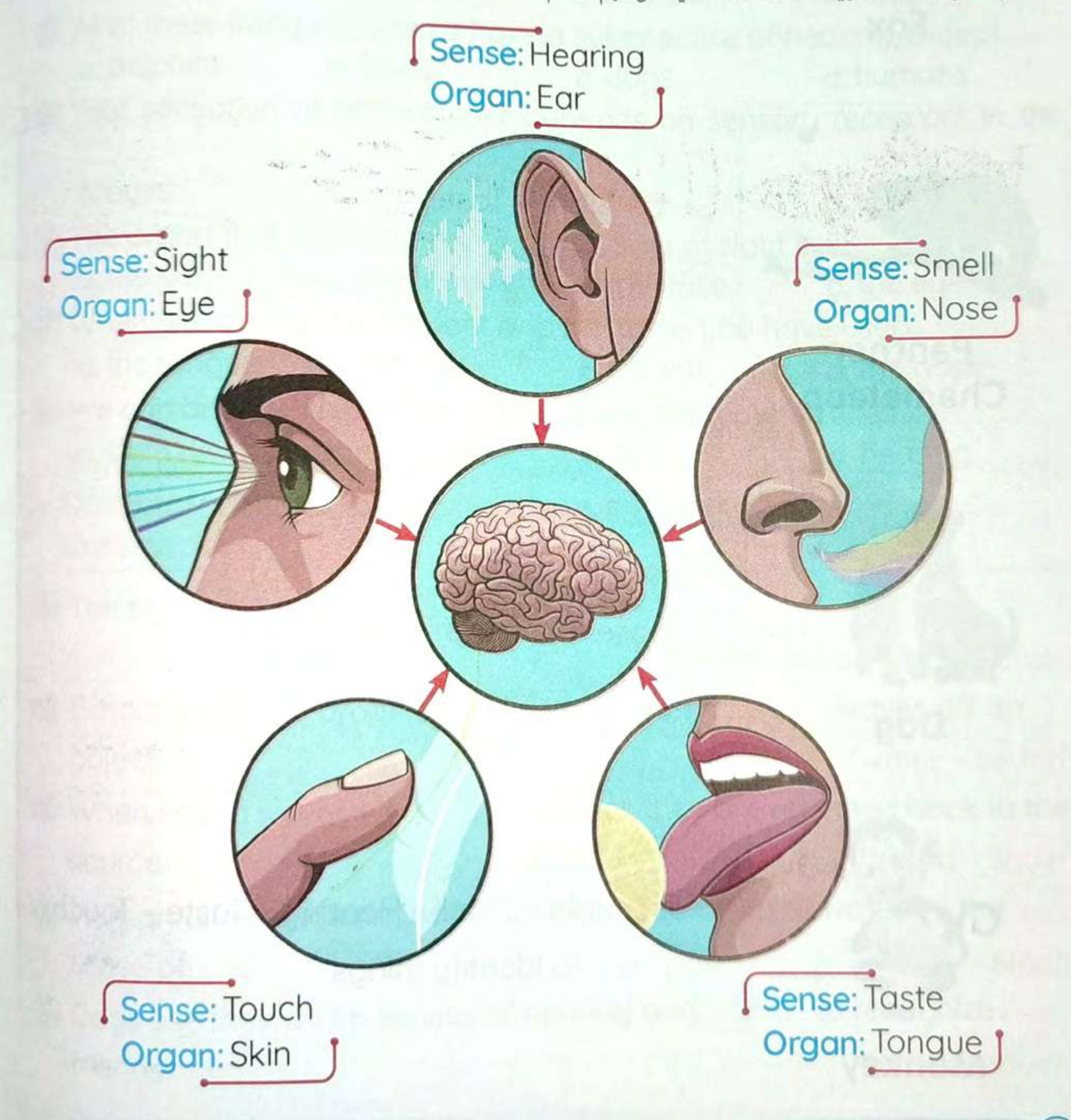
Activity 3 What Do You Already Know About Senses at Work?

Senses and Organs

- Each **sensory organ** is responsible for receiving a special type of information from the environment, and then sending it to the brain.
- The **brain** translates the information and helps living organisms understand the world around them, communicate, and survive.

• كل عضو حسي مسئول عن تلقي نوع خاص من المعلومات من البيئة ثم إرسال تلك المعلومات إلى العقل.

• يترجم العقل المعلومات ويساعد الكائنات الحية على فهم العالم من حولهم والتواصل والبقاء على قيد الحياة.



Unit

Animals Perceptions

Animals can use more than one sense to achieve a purpose that helps them survive in their habitats.



Fox

Sense: Sight - Hearing

Purpose: To avoid danger





Panther Chameleon

Sense: Sight - Taste

Purpose: To find food



Dog

Sense: Sight - Smell

Purpose: To recognize friends



Monkey

Sense: Sight - Smell - Hearing - Taste - Touch

Purpose: To identify things

Exercises on Lesson 1

1 Choose the correct answer:

1. When you touch an ice cube with your index finger, your .... tells you it is cold.
   a. index finger b. hand c. brain d. skin
2. .... use a property known as echolocation to hunt in water.
   a. Bull sharks b. Dolphins c. Polar bears d. Bats
3. Mongooses communicate together by producing ....
   a. flashlights b. a smell c. sounds d. heat
4. All of these living organisms have a super sense of hearing, except ....
   a. dolphins b. foxes c. dogs d. humans
5. Your sensation of hot weather depends on sensory receptors in the ....
   a. eyes b. skin c. nose d. ear
6. The organ that is responsible for the sense of sight is ....
   a. the ear b. the tongue c. the nose d. the eye
7. When you determine a sweet or bitter taste, you have used ....
   a. the tongue b. the eye c. the ear d. the nose
8. We can distinguish between vinegar and perfume by ....
   a. sight b. smell c. touch d. hearing

2 Complete the following sentences from the words between the brackets:

1. The echo sound feature depends on the .... (hearing sense - sight sense)
2. Echolocation is a property that uses bounced .... waves off an object. (water - sound)
3. When sound waves hit a .... object, they are reflected back to the source. (solid - liquid)
4. We can differentiate between a hot and cold cup of water by the sense of .... (touch - smell)
5. Dogs use their sharp senses of hearing and .... to recognize friends. (smell - touch)

6 Echo is the .... of sound waves. (refraction - reflection)

7 The sharp sense of hearing in dolphin is a .... adaptation. (structural - behavioral)

8 Most animals have .... senses than humans. (weaker - sharper)

9 Dolphins can locate their prey in dark water using their .... sense. (hearing - sight)

3 Put (✓) or (✗):

1 Dolphins have a strong sense of sight. ( )

2 Dolphins and bull sharks use echolocation to find food at night. ( )

3 The ear is the sense organ that is responsible for seeing objects. ( )

4 The skin is the sensory organ that makes you feel the smoothness of the cloth. ( )

5 A person can identify food that is not good through the sense of hearing. ( )

6 Adam can identify the scent of a flower using his sense of sight. ( )

7 We can know if the food is spicy or not using our sense of taste. ( )

4 Complete the following sentences using the words between the brackets:

(smell - monkey - echolocation)

1 All the senses of the .... are sharp to identify things.

2 Dogs have sharp senses of .... and sight.

3 Dolphins depend on the .... property to hunt in dark water.

5 Cross out the odd word:

1 Dolphins - Sound waves - Echolocation - Bull shark

2 Touch - Nose - Eye - Ear

3 Hearing - Touch - Tongue - Sight

6 Write the scientific term:

1 It is the reflection of sound waves back from a solid surface to their source.

2 A property that helps dolphins locate their prey in the dark water.

3 The sense that helps dolphins detect echo.

4 The sensory organ that helps humans identify the taste of food.

5 The sense that helps us identify the scent of flowers.

6 The sensory organ that helps chameleons catch insects.

7 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 The fennec fox	a. produces sounds that seem as chatter.
2 Dolphins	b. has super senses of hearing and sight.
3 The Egyptian mongoose	c. has sharp senses of taste and sight.
4 The panther chameleon	d. locate prey using echolocation.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 I can .... a bird flying up in the sky.	a. smell
2 I can .... a beautiful song on the radio.	b. touch
3 I can .... a flower with my nose.	c. hear
4 I can .... a delicious sandwich.	d. see
5 I can .... the soft fur of a rabbit.	e. taste

1 .... 2 .... 3 .... 4 .... 5 ....

8 Give reasons for:

1 Egyptian mongooses make sounds like chatter.

2 Dolphins can locate their prey in the dark water.

9 What happens if:

1 The sounds produced by a dolphin hit a fish in the water?

2 Dolphins have a weak sense of hearing?

Lesson 2

Unit

Activity 4 Senses of Nocturnal Animals

- If you want to find your cat in a dark room, your ears would detect noise, but it would be hard to see anything.



Some animals are active at night, and they are called nocturnal animals.



Bat (Mammal)



Owl (Bird)



Jerboa (Rodent)

Super sensory adaptations allow these animals to navigate the darkness safely and find food.

- تنشط بعض الحيوانات أثناء الليل، وتُسمى تلك الحيوانات بالحيوانات الليلية.
- تسمح التكيفات الحسية الفائقة لهذه الحيوانات بالتنقل في الظلام والعثور على الطعام.



Why do some animals hunt at night?



1. The animal may live in an extremely hot place, so it prefers to look for food at night when the weather becomes cooler.
2. Some prey are only available at night.
3. Some animals depend on complete darkness to surprise their prey.

1. قد يعيش الحيوان في منطقة حارة؛ لذلك يفضل البحث عن الطعام ليلًا عندما يصبح الجو باردًا.
2. تتوفر بعض الفرائس في الليل فقط.
3. تعتمد بعض الحيوانات على الظلام الدامس للتخفي ومفاجأة الفريسة.



- Bats can't see very well in the dark, so they rely on **echolocation** to find insects.
- They can hear the echo bounced from objects, so they can find food and move around.

- لا ترى الخفافيش بشكل جيد في الظلام؛ لذا فإنها تعتمد على خاصية تحديد الموقع بالصدى للعثور على الحشرات.
- تستطيع الخفافيش سماع الصدى المرتد من الأجسام؛ وبالتالي تستطيع العثور على الغذاء والحركة.



- Owls have extraordinary **sight** and **hearing** senses.

- لدى البوم حاستا بصر وسمع خارقتان.

- Owls have **large eyes** 

To allow them to see tiny, far-away movements.

- لدى البوم عيون كبيرة تسمح برؤية الحركات الضئيلة والبعيدة.

- **They have bowl-shaped faces and specialized head feathers to:** GR

1. Pick up distant sounds and amplify them.
2. Direct these sounds directly into the owl's ears.

- **يساعده وجهه الذي يشبه الوعاء والريش الموجود في رأسه على:**

1. التقاط الأصوات البعيدة وتضخيمها.
2. توجيه تلك الأصوات إلى أذنَي البومة مباشرة.

- **Owls can rotate (turn) their heads in all directions** GR

To search for prey in every direction.

- لدى البوم القدرة على لف رأسها في كل الاتجاهات؛ مما **يساعدها في البحث عن الفرائس** في كل الاتجاهات.



Unit 1

Activity 5 The Nervous System

» Mammals, such as humans, elephants, and dogs have the same nervous system.

تعتبر أعضاء الحواس الخمسة، مثل: العين والأنف والأذن واللسان والجلد، جزءًا هامًا من الجهاز العصبي.

The Nervous System Consists of:

Brain

Function:

- It is the main control center of the body.

- **الوظيفة:** مركز التحكم الرئيسي في جسم الإنسان.

Spinal Cord

- It is a big nerve that runs through the backbone.

Function:

- It carries messages to and from the body and brain.

- إنه عصب كبير يمر عبر العمود الفقري.
- **الوظيفة:** ينقل الرسائل من وإلى الجسد والمخ.

Nerves

- They are distributed throughout the body.
- They connect the sense organs with the brain.

Function:

- They carry messages from the brain to spinal cord and body parts and vice versa.

- تتوزع في جميع أنحاء الجسم. • تربط أعضاء الحس المختلفة بالمخ.
- **الوظيفة:** تنقل الرسائل من المخ إلى النخاع الشوكي وأجزاء الجسم أو العكس.

» The brain is connected to a big nerve that runs through the backbone called the spinal cord and branches out into smaller nerves distributed all over the body.

- يتصل المخ بعصب كبير يُسمى النخاع الشوكي، ويتفرع النخاع الشوكي إلى أعصاب أصغر تتوزع في جميع أنحاء الجسم.





Notes:

- Few nerves are connected directly to the brain, such as the nerves of the eyes.

- تتصل بعض الأعصاب مباشرة بالمخ مثل أعصاب العينين.

Sensory Receptors

They are nerves that receive information from the environment.

مستقبلات حسية: هي الأعصاب التي تستقبل المعلومات من البيئة المحيطة.

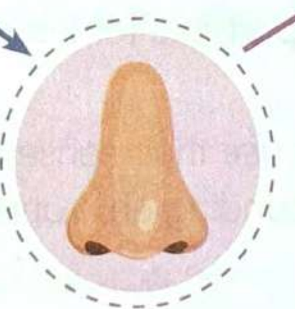
How does the nervous system work?

1. **Sensory receptors** receive information from the environment.
2. **Nerves** carry a message from sensory receptors to the brain.
2. **The brain** translates the message and tells the body what to do.

Example: When you smell pizza,



- The pizza odor travels to the nose.
- تنتقل رائحة البيتزا إلى الأنف.



- The brain translates the message and tells the body what to do.
- يعالج المخ المعلومات ويحدد ما يجب فعله.

- Sensory receptors at the back of the nose receive the message.
- Sensory receptors send the message to the brain through nerves.

- تستقبل المستقبلات الحسية الموجودة خلف الأنف تلك المعلومة.
- تقوم المستقبلات الحسية بإرسال إشارة للمخ عبر الأعصاب.

Activity 6 Sensing the Environment

When the girl touches the spines of a cactus plant, she will move her hand quickly (in less than one second).



• عندما تلمس البنت الشوك في نبات الصبار تقوم بإبعاد يديها بسرعة.

When a jerboa hears a snake moving nearby, it jumps quickly and escapes (in less than one second).



• عندما يسمع اليربوع صوت الثعبان يقوم اليربوع بالقفز سريعًا والهروب.

- The nervous system is responsible for keeping living organisms away from danger.
- Both humans and animals use their sense organs and nervous systems to sense the surrounding environment and avoid danger.

• الجهاز العصبي هو المسئول عن الإحساس بالخطر والابتعاد عنه.

• يعتمد كلٌ من الإنسان والحيوان على الحواس والجهاز العصبي للإحساس بالبيئة وتجنُّب الخطر.

Reaction Time

It is the time taken by an organism's body to respond to danger.

زمن الاستجابة: هو الوقت الذي يستغرقه الكائن الحي للاستجابة للخطر.

Jumping Jerboa

S represents structural adaptations.
B represents behavioral adaptations.

» It is a desert rodent.

• من القوارض الصحراوية.



S It has large sensitive ears

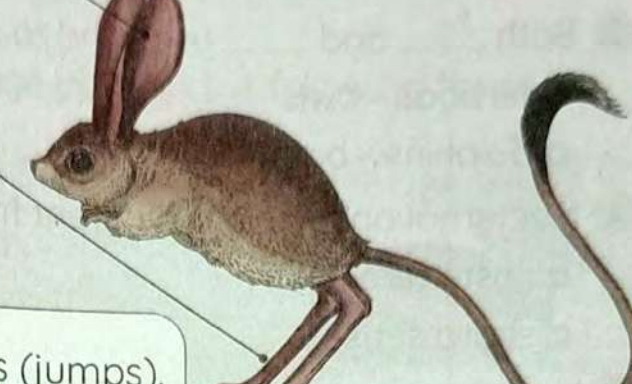
• To hear the quiet movement of snakes (vipers).

• له آذان طويلة تساعده على سماع حركة الثعبان القريب منه.

S It has long hind legs

• To enable it to jump for a long distance.

• له سيقان طويلة لمساعدته على القفز لمسافات طويلة.



S It has hair on feet and toes

• To help it grip sand when it hops (jumps).

• الشعر الموجود على قدمه وأصابعه يساعده على إمساك الرمال عند القفز.



B

• Jerboa hops in zigzag patterns to escape quickly from danger.

• يقوم اليربوع بالقفز في مسارات متعرجة للهروب سريعًا من الخطر.



B

• Jerboa searches for food at night.

• يقوم اليربوع بالبحث عن غذائه في الليل.



How jerboa's body work together to avoid danger



• On hearing the noise of a snake moving nearby,



1. Sensory receptors in the ears send a message to the brain through nerves.
2. The brain translates information and responds by alerting legs to jump.
3. Jerboa's strong hopping legs start to jump away to escape from danger.

• تقوم الحواس المستقبلة في أذن اليربوع بإرسال رسالة للمخ عبر الأعصاب.

• يترجم العقل تلك المعلومة ويعطي استجابة لليربوع بالقفز للابتعاد عن الخطر.

• تبدأ سيقان اليربوع بالحركة والقفز للهروب من الخطر.

Exercises on Lesson 2

1 Choose the correct answer:

1. .... have the ability to turn their heads in all directions.
   a. Snakes b. Jerboas c. Dolphins d. Owls
2. Bats are .... animals.
   a. nocturnal b. morning c. harmful d. not flying
3. Both .... and .... use echo to search for food.
   a. jerboas - owls b. owls - dolphins
   c. dolphins - bats d. owls - bats
4. Nocturnal animals are different from humans in that they have ....
   a. systems b. sensory organs
   c. sharp senses d. weak senses
5. Nocturnal animals become active at night to ....
   a. stay warm during the daytime b. attack their predators
   c. surprise their prey d. escape from prey
6. All the following are components of the nervous systems except, the ....
   a. spinal cord b. heart c. nerves d. brain
7. The .... system helps us translate messages that come from our surroundings, such as smells and sounds.
   a. respiratory b. digestive c. nervous d. circulatory
8. Our eyes help us see what's around us. What is the organ that is responsible for processing what we see with our eyes?
   a. The lungs b. The esophagus
   c. The stomach d. The brain
9. What carries the message from your eyes to your brain when you see something?
   a. The nerves b. The muscle c. The veins d. The glands
10. The .... is/are connected to the brain and located inside the backbone.
    a. spinal cord b. heart c. nerves d. lungs

11 The nerves of the .... are connected directly to the brain.

a. ear b. skin c. eye d. nose

12 The .... is the main control center in the body of living organisms.

a. heart b. esophagus c. stomach d. brain

13 Which of the following is considered a behavioral adaptation?

a. The long hind leg of a jerboa

b. The bowl-shaped faces of owls

c. The extraordinary senses of nocturnal animals

d. Hunting during the night

14 The correct order of nerve message path for the following figure is ....

a. Nerves → nose → brain

b. Ears → nerves → brain

c. Tongue → nerves → brain

d. Tongue → brain → nerves

15 Jerboas and .... exist in the same habitat.

a. Arctic foxes b. fennec foxes

c. panther chameleons d. polar bears

16 All of the following have large ears, except the ....

a. fennec fox b. caracal c. jerboa d. polar bear

17 Sameh drives his bike, and when he hears a car behind him, he turns away so as not to hit it. The system that received a signal made Sameh realize that it was the ....

a. nervous system b. respiratory system

c. digestive system d. circulatory system

18 The Egyptian jerboa is considered a ....

a. reptile b. bird c. rodent d. lizard

19 At night, the jerboa could be prey for ....

a. insects and rabbits b. snakes and fennec foxes

c. polar bears and owls d. Arctic foxes and bats

20 When jerboa senses the noise of a snake nearby, ...

a. it puffs its body to scare it b. it changes its color

c. it jumps fast and escape d. it opens its mouth wide

21 The response of the jerboa to jump quickly and escape takes ....

a. one second
b. 2 seconds
c. 0.2 second
d. 10 seconds

22 .... help(s) jerboa stay safe from any danger.

a. Its adapted body parts
b. Its nervous system
c. Its sensory receptors
d. All the previous

2 Complete the following sentences from the words between the brackets:

1 The skin is an important organ of the .... system of human. (respiratory - nervous)

2 Being active at night in some animals is a .... adaptation. (structural - behavioral)

3 An owl can rotate its .... in all directions. (eyes - head)

4 An owl has a .... shaped face to hear its prey. (bowl - oval)

5 An owl has .... on its head to direct sounds to its ears. (feathers - scales)

6 A .... uses echolocation to find its prey in the air. (dolphin - bat)

7 A/an .... can see a rat moving in grass at night. (owl - bat)

8 The eye sends messages to the .... through the nerves. (brain - spinal cord)

9 The .... is one of the organs that we can use to watch television. (eye - heart)

10 The spinal cord extends inside the .... (backbone - skull)

11 The spinal cord branches into smaller .... (blood vessels - nerves)

12 Sensory receptors in the .... receive the odour of a pizza. (nose - tongue)

13 In order for the human being to remain alive, there is an integration between the senses and the .... system to interact with the surrounding environment. (respiratory - nervous)

14 A .... is an animal that can escape from enemies because of the length of its hind legs. (Arctic fox - Jerboa)

15 As the reaction time ...., jerboa can escape from snakes. (decreases - increases)

16 If the reaction time of the jerboa is ...., it will be dinner for a viper. (delayed - fastened)

17 In case of danger, jerboa jumps in a .... path. (straight - zigzag)

18 Large ears in jerboa are a .... adaptation. (behavioral - structural)

19 Jerboa lives in the .... (forest - desert).

20 Jerboa's feet and toes are covered with .... to catch sand. (hair - fats)

Concept 2

3 Put (✓) or (✗):

1. Nocturnal animals hunt at night to surprise their prey in the dark. ( )
2. Bats wait for the echo produced by insects to attack them. ( )
3. Both the spinal cord and nerves carry messages in one direction. ( )
4. The nerves of the eyes are directly connected to the brain. ( )
5. The human nervous system is similar to that of elephants. ( )
6. Sensory organs gather information and the brain interprets it. ( )
7. The sense of sight in owls is stronger than that in bats. ( )
8. Information is transmitted from the sensory organs to the brain via the nerves. ( )
9. Jerboas have large ears and long-hind legs. ( )
10. You can differeniate between vinegar and water through your sense of sight. ( )
11. The nervous system works separately from the five senses. ( )
12. The brain is responsible for processing information. ( )
13. When jerboa jumps in zigzag paths to escape, this is considered a structural adaptation. ( )
14. The nervous system of jerboa helps it stay safe. ( )
15. The snake could be prey for desert jerboa. ( )
16. Reaction time always takes more than one second. ( )
17. On hearing danger, the sensory receptors in the jerboa's ears send a message to the brain. ( )

4 Complete the following sentences using the words between the brackets:

A

(rodent - nerves - brain - mammal - message - owl)

1. Sensory receptors send a .... to the .... through the ....
2. Bat is a ...., while jerboa is a ....
3. An .... has a bowl-shaped face.

B

(survive - ears - long - danger - reaction time - zigzag - decreases - increases)

1. The time taken by a jerboa to run away from a snake is called the ....
2. As the reaction time to a danger ...., an animal has a greater chance to ....
3. Jerboa has large .... and .... hind legs.
4. Jerboa can jump in a .... path to escape quickly from any danger.
5. The nervous system always keeps animals away from ....

5 Write the scientific term:

1. Animals that search for food at night.
2. A property that helps dolphins and bats locate their prey in the dark.
3. A flying mammal depends on echolocation to locate mosquitoes.
4. A nocturnal bird that has a bowl-shaped face with feathers.
5. The system that is responsible for feeling if the water is cold or hot.
6. The main control center in the animal's body.
7. It passes through the backbone and is connected to the brain.
8. The branches that extend all over the body parts and carry messages.
9. Nerves that receive information from their surroundings.
10. A desert rodent that has very large ears and long hind legs.
11. The system that keeps living organisms safe from danger.
12. The time taken by living organisms to respond to danger.
13. The organ that translates information and gives a suitable response.
14. The type of adaptation in which jerboa hops in a zigzag path.

6 Cross out the odd word:

1. Owl - Bat - Panther chameleon - Jerboa
2. Nose - Tongue - Skin - Heart
3. Jerboa - Penguin - Arctic fox - Polar bear

7 Classify the following in this table:

Sight - Tongue - Nose - Smell - Eye - Ear - Touch - Skin - Hearing - Taste

Senses	Sensory Organs
....	....
....	....

8 Classify the following animals according to the strategy of hunting:

Dolphins - Fennec fox - Chameleon - Bull shark - Bats

Strategy of Hunting	Echolocation	Camouflage
Animals	....	....



9 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 The brain	a. are nerves found in sensory organs that receive information.
2 The spinal cord	b. is located inside the backbone.
3 The nerves	c. is the main control center of the body of living organisms.
4 Sensory receptors	d. are distributed all over the body.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 An owl	a. communicates by producing sounds as chatter.
2 A bat	b. uses echo to catch insects.
3 A dolphin	c. can turn its head in all directions.
4 The Egyptian mongoose	d. uses echo to locate its prey in the dark water.

1 .... 2 .... 3 .... 4 ....

C

Column (A) Jerboa (Structural adaptation)	Column (B) (The reason)
1 Long hind legs	a. to catch sand during jumping.
2 Hair on its feet	b. to jump for a long distance.
3 Very large ears	c. to sense any noise from a nearby snake.

1 .... 2 .... 3 ....

10 Study the following figure, then answer the questions:

1. What does the opposite figure represent?
2. Does this system exist in the human body only?
3. Label the following:

a. .... b. ....

c. ....

a
b
c

11 Study the following figures, then complete the sentences below:

Figure (1)	Figure (2)	Figure (3)

1. Figure .... represents a mammal that uses .... to hunt at night.
2. Figure .... represents a rodent that live in the ....

3 Figure .... represents a bird that has .... face.

4 All the previous animals are called .... animals because they have the ability to hunt during the .... in the ....

12 Arrange the following steps:

a. (........) Jerboa jumps on zigzag paths quickly.

b. (........) The brain translates the messages.

c. (........) On hearing danger, the sensory receptors sense it.

d. (........) The brain sends a response to the alert legs of the jerboa.

e. (........) The sensory receptors in the ear send messages to the brain.

13 Give reasons for:

1 Nocturnal animals prefer to hunt at night.

2 Although bats can't see in the dark, they can find food.

3 An owl has a bowl-shaped face and feathers on its head.

4 The brain is the main control center of the body.

5 The nervous system is very important for living organisms.

6 The jerboa has large ears.

7 The jerboa has long hind legs.

8 The feet and toes of a jerboa have hair.

14 What happens if:

1 The sound waves produced by a bat hit an insect's body?

2 The brain receives a message from the sensory receptors?

3 A girl touches the spines of a cactus plant?

4 A jerboa hears a snake moving nearby?

Lesson 3

Unit 1

Activity 7 How the Nervous System Works

The nervous system is very busy; it has three jobs:

1. It gathers information about what is happening inside or outside the body.
2. It translates and processes the information.
3. It tells the body what to do.

1 جمع المعلومات عما يحدث داخل أو خارج الجسم. 2 ترجمة تلك المعلومات.

3 إرسال استجابة مناسبة لما ينبغي أن يقوم به الجسم.

For example, the girl hears a chirping bird.

1. Sensory receptors in the ears receive the information.
2. Nerves carry the information to the brain.
3. The brain translates this information.
4. The brain sends a message to the body about what to do.
5. The girl turned to look for the bird on the tree.

1 تقوم الحواس المستقبلة في الأذن باستقبال المعلومات. 2 ترسل الأعصاب تلك المعلومات إلى المخ.

3 يترجم العقل تلك المعلومات ويقوم بتفسيرها. 4 يرسل المخ رسالة إلى الجسم ليخبره ماذا ينبغي أن يقوم به.

5 تلتفت الفتاة للبحث عن الطائر على الشجرة.



Notes:

- Some messages, called reflexes, are so fast you are barely aware of them, such as:
  1. Blinking when a strange object gets closer to your eyes.
  2. Moving your hand away when you touch a hot object.
- Other messages are relayed to and from the brain automatically, like the signal to breathe.

- بعض الرسائل المعروفة بردود الفعل المنعكسة تصل بسرعة كبيرة للغاية لا تتمكن من إدراكها مثل:
  1 إغماض العينين عندما يأتي جسم قريب منها.
  2 تحريك يدك بعيدًا عند لمس جسم ساخن.
- بعض الرسائل يتم نقلها للمخ تلقائيًا ولا يمكننا التحكم بها مثل التنفس.

Activity 8 Describing the Nervous System

» The parts of the nervous system work together to:

1. Sense the environment.
2. Interpret the information to decide the best action.
3. Send a signal to the body to react.

• تعمل أجزاء الجهاز العصبي معًا.

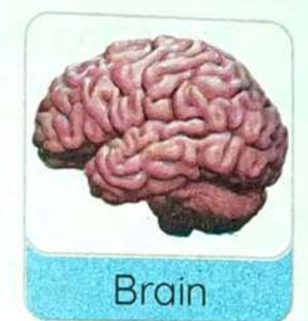
• لإدراك البيئة وتفسير المعلومات للقيام بالفعل المناسب؛ ومن ثم نقل الإشارات إلى الجسم للاستجابة.

» Without all of the parts of the nervous system, the person might not receive, send, or react to the information.

• لن يتمكن الشخص من استقبال المعلومات وإرسالها والاستجابة لها بدون وجود كل أجزاء الجهاز العصبي.

1 Look at the following images. Which of these is part of the nervous system? Circle all that apply.


Spinal cord


Brain


Nerves


Blood

2 Read the following sentences that describe the nervous system, then choose the suitable word from the brackets:

(Heart - nervous system - brain - Reflexes - nerves - blood)

1. The .... is like the command center for your body.
2. The .... send(s) messages to the brain.
3. The brain is a part of the ....
4. .... are messages sent by the nervous system that are often so fast that you don't think about them.

Exercises on Lesson 3

1 Choose the correct answer:

1. The components of the nervous system are connected to each other by ....
   - a. the muscles
   - b. the nerves
   - c. the tissues
   - d. the blood vessels
2. The nervous system is responsible for ....
   - a. gathering the information
   - b. translating the information
   - c. telling the body what to do
   - d. all the previous answers
3. Information is transmitted from the .... to the .... through the nerves.
   - a. brain - lungs
   - b. muscles - brain
   - c. sensory organs - brain
   - d. muscles - sensory organs
4. The brain is responsible for all the following, except ....
   - a. translating the information
   - b. sending signals to the muscles
   - c. receiving signals from the sensory receptors
   - d. gathering the information
5. Which statement is wrong about "Nerves"?
   - a. They connect the components of the nervous system together.
   - b. They are the main control center of the body.
   - c. They carry messages from the sensory organs to the brain.
   - d. They are branches that extend throughout the body.
6. What is the correct sequence that explains the following figure?
   - a. Eyes → nerves → hand → brain
   - b. Hand → brain → nerves → eyes
   - c. Eyes → nerves → brain → hand
   - d. Hand → brain → eyes → nerves
7. What is the correct sequence that explains the following figure?
   - a. Nose → nerves → brain → hand
   - b. Hand → brain → eyes → nerves
   - c. Nose → nerves → brain → hand
   - d. Hand → nerves → brain → hand

2 Complete the following sentences from the words between the brackets:

1. The .... processes the sound waves coming from a radio. (spinal cord - brain)
2. The .... identifies the sour taste of a lemon. (tongue - nose)
3. The .... interprets information gathered by the sensory organs. (brain - spinal cord)
4. When you smell a burning food, your .... sends a signal to the brain. (tongue - nose)
5. The .... sends an automatic signals to breathe. (brain - lung)
6. The sense of .... causes the jerboa to recognize a viper's noise. (sight - hearing)
7. Reflexes are .... responses transmitted by the nervous system. (slow - fast)

3 Put (✓) or (✗):

1. The brain is responsible for translating information. (   )
2. All the components of the nervous system work together. (   )
3. Sensory receptors are responsible for breathing and digestion. (   )
4. Nerves are branches that are found throughout the body of a living organism. (   )
5. The brain sends signals to the body to tell it what to do. (   )
6. The brain can't deal with information transmitted by our ears and eyes at the same time. (   )
7. Some messages are transmitted automatically, like the signal to breathe. (   )
8. Blinking your eyes when something comes near is considered a reflex action. (   )

4 Complete the following sentences using the words between the brackets:

(skin - reflex - run - nervous system - breathe - withdraw)

1. When touching a very hot object, you quickly .... your hand as a .... action.
2. The sensory receptors in the .... sense the coldness of the weather.
3. The .... is responsible for reflexes.
4. The brain sends automatic signals to ....

5 Write the scientific term:

1. They are nerves that receive information from the environment.
2. They connect the components of the nervous system together.
3. An organ that translates information and sends the suitable response to the muscles.
4. The big nerve that passes through the backbone.
5. The time taken by the body to respond to danger.
6. They're messages that are transmitted so fast that you are barely aware of them.
7. The organ that can distinguish between sugar and salt.
8. The sense that can distinguish between rough and smooth surfaces.

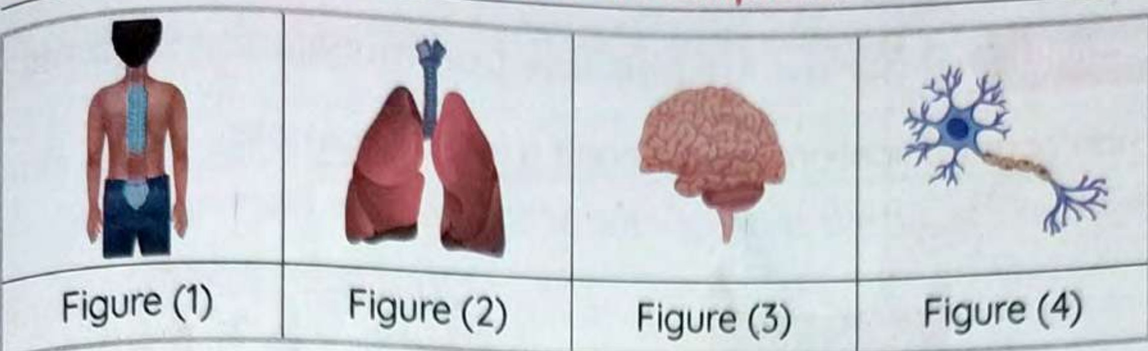
6 Cross out the odd word:

1. Brain – Stomach – Nerves – Spinal cord
2. Eyes – Nose – Touch – Ear
3. Tongue – Hearing – Sight – Smell

7 Compare between the following:

P. O. C.	Sensory Receptors	Brain
Function	....	....

8 Study the following figures, then complete:



1. Figure (........) is not from the components of the respiratory system.
2. Figure (........) is the main control center of the living organism's body.
3. Figure (........) is located inside the backbone, and it's connected to the brain by nerves.
4. Figure (........) is responsible for carrying the information through the body.

9 Arrange the following steps:



- a. (........) The girl turns around to search for the bird.
- b. (........) The girl's ears send this information to the brain.
- c. (........) The brain sends a signal to the body.
- d. (........) The girl's ears hear the sound of the bird.
- e. (........) The brain processes this information.

10 Give a reason for:

- The nervous system has great functions.

....

....

11 What happens if:

- A strange object gets closer to your eyes?

....

....



Lesson 4

Unit 1

Activity 9 How Animals Use Communication Systems

Human communication has changed a lot, for example:

- People first started sharing information using written symbols.





- Technology systems allow us to call, text, and email messages over great distances.







Animals do not use technology systems as we do,
but they can still use other systems to communicate, for example:

- Ants communicate together using their sense of smell.
- Humpback whales communicate by singing a wide range of tones.



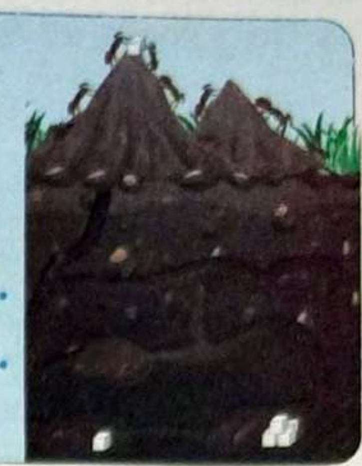


- تغيَّر التواصل بين البشر كثيرًا.
- بدأ البشر مشاركة المعلومات بالرموز المكتوبة.
- تتيح لنا أنظمة التواصل التكنولوجية إجراء المكالمات الهاتفية، وإرسال الرسائل النصية، ورسائل البريد الإلكتروني عبر مسافات بعيدة.
- لا تستخدم الحيوانات أنظمة التواصل التكنولوجية التي نستعملها كبشر، لكنها تظل قادرة على استخدام أنظمة تواصل أخرى.
- يستخدم النمل حاسة الشم للتواصل بينهم.
- تغني الحيتان الحدباء نغمات مختلفة للتواصل مع بعضها.

1 Ant Communication

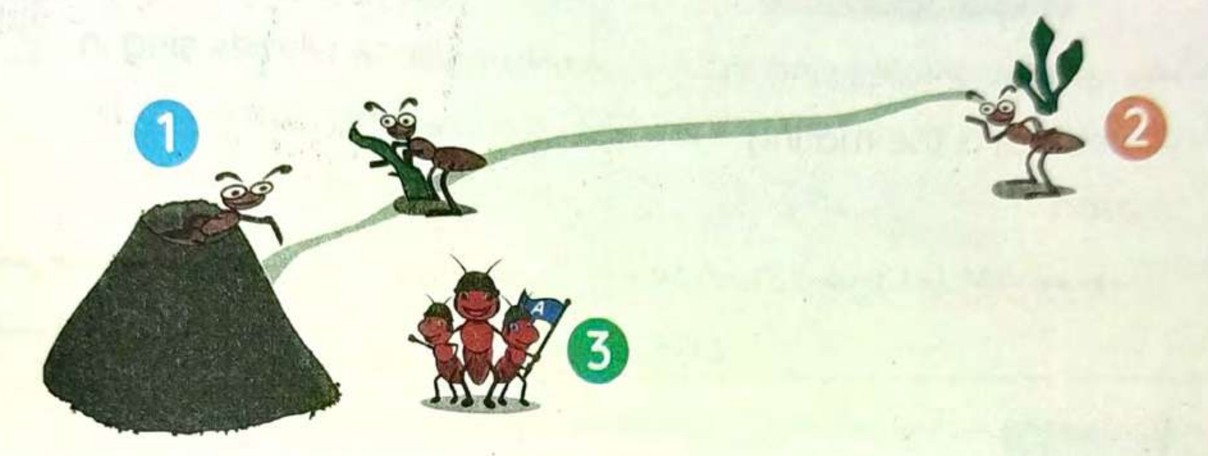
- Ants live in colonies that contain thousands of individuals.
- Ants use their sense of smell to communicate.

- يعيش النمل في مستعمرات بها آلاف الأفراد.
- يستخدم النمل حاسة الشم للتواصل بينهم.



» Ants have developed systems that help them divide their work.

» Groups of ants within a colony have different roles.



1 Nurse Ants	**Nurse ants send strong smelly messages.**  To alert scout ants that are responsible for locating food.
2 Scout Ants	They search for food and locate it.
3 Soldier Ants	They use smells to communicate if there is danger nearby.

- يتبع النمل داخل المستعمرة الواحدة أنظمة تساعدهم على تقسيم العمل فيما بينهم.
- تؤدي مجموعات النمل أدوارًا مختلفة داخل المستعمرة:

[1] عاملات النمل: تُطلق رائحة قوية كرسائل تنبيه للنمل الكشاف المسئول عن تحديد موقع الطعام.

[2] النمل الكشاف: يبحث عن الطعام، ثم يرشد عنه.

[3] جنود النمل: تتواصل معًا بإطلاق الروائح في حالة وجود خطر قريب.

2 Humpback Whales Communication



- They sing a wide range of tones and a series of songs to communicate.
- The songs of humpback whales have different sound pitches depending on the season.

- تغني الحيتان الحدباء بنغمات مختلفة وسلسلة من الأغاني للتواصل مع بعضها تحت المياه.
- تختلف حدة الصوت في الأغاني التي تصدرها الحيتان الحدباء حسب الفصول المناخية.

In Winter

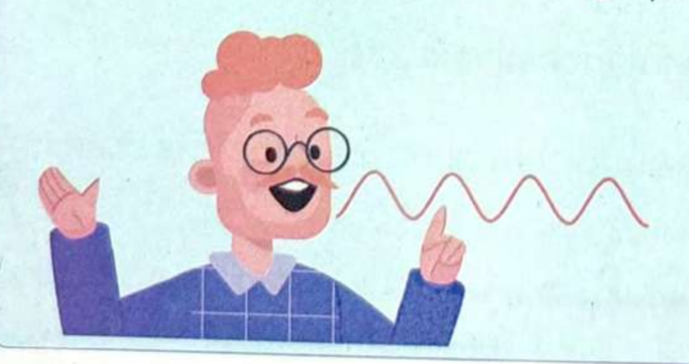
- Humpback whales sing in winter that is the mating season.
- تغني الحيتان الحدباء في فصل الشتاء وهو موسم التزاوج.

In Summer

- Humpback whales sing in summer that is the feeding season.
- تغني الحيتان الحدباء في فصل الصيف وهو موسم التغذية.

Notes:

- A man has a rough voice. (Low-pitched sounds)
- A woman has a sharp voice. (High-pitched sounds)





STEM in Action

Activity 10 Technology Inspired by Nature



1 Bats:

- Many animals, such as bats, use sound to communicate with each other.
- Bats also use sound to get information about their surroundings, as follows:

1. A bat produces a high-pitched sound.
2. The sound hits the object (an insect) and reflects back.
3. The bat listens for an echo (reflected sound).
4. The bat locates the object nearby.

1 يُصدر الخفاش صوتًا له درجة عالية. 2 عندما يصطدم الصوت بحشرة فإنه يرتد مرة أخرى.

3 يسمع الخفاش الصدى أو الصوت المرتد. 4 يحدد الخفاش موقع الحشرة القريبة منه.

2 Cane: (Bat-Inspired Technology)

- Scientists created a cane that emits a high-pitched sound to help blind people detect their surroundings.

• ابتكر العلماء عكازًا يُصدر صوتًا عالي التردد؛ لمساعدة الشخص الكفيف لتحديد موقع الأشياء المحيطة به.

How does a blind person use the cane?

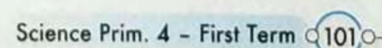


1. As the blind person walks, this special cane picks up the echo of high-pitched sounds.
2. Echo is turned into vibrations that the person can feel using his thumb.
3. These vibrations tell the blind person about nearby bodies.

1 عند تحرك الشخص الكفيف يلتقط العكاز صدى الصوت عالي التردد.

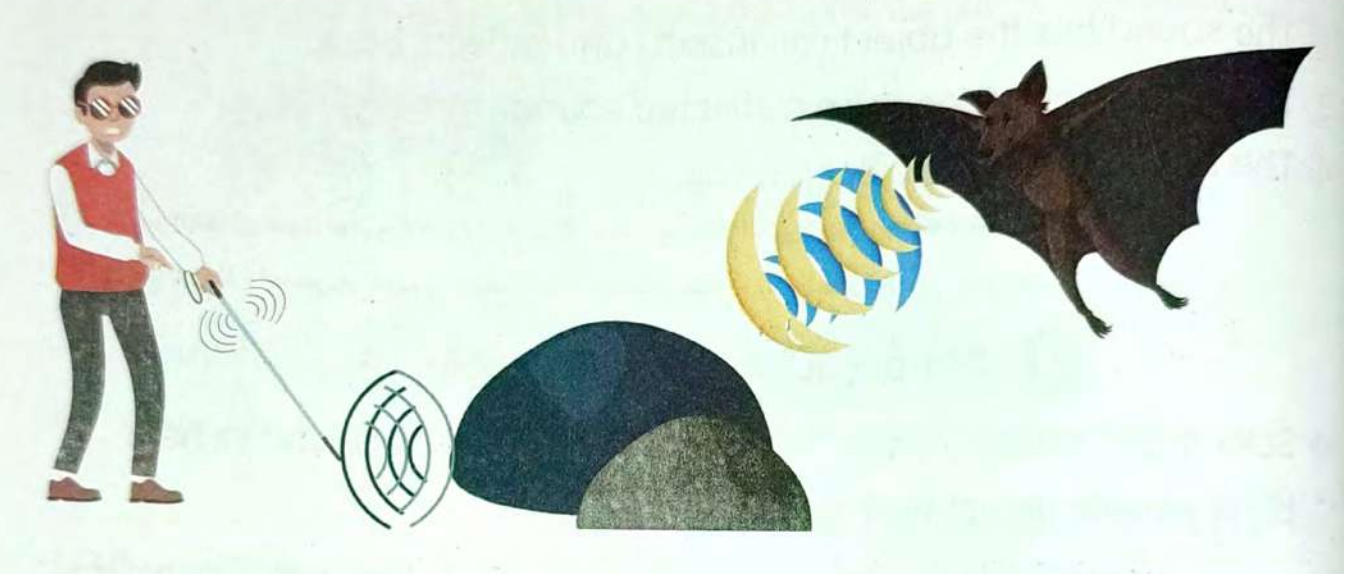
2 يتحول صدى الصوت لاهتزازات يشعر بها الشخص بإبهامه.

3 تدل تلك الاهتزازات الشخص بالأجسام من حوله.



1. **Bats use their ears to "see" in the dark.** GR
   Because bats use their ears for echolocation that enables them to get information about their surroundings.
2. **A special cane helps a blind person to walk alone.** GR
   Because the cane picks up the echo and turns it into vibrations that tell the blind person about nearby bodies.

Similarities and Differences between Bats and Canes



	Bats	Canes
Differences	• Bats can't change echo into vibrations. • Bats use their strong hearing sense to pick up the echo.	• Canes change echo into vibrations. • A blind person uses his sense of touch to pick up the echo.
Similarities	• They depend on echo to locate things. • They produce high-pitched sounds.	

Exercises on Lesson 4

1 Choose the correct answer:

1. Ants communicate together using ....
   a. sound patterns b. light patterns
   c. motion patterns d. their sense of smell
2. Nurse ants send a smelly message to scout ants in case of ....
   a. Mating season b. A danger nearby
   c. Lack of food d. Lack of water
3. .... are responsible for searching for the food resources.
   a. Nurse ants b. Scout ants
   c. Solider ants d. Scavengers ants
4. Solider ants send a smelly message to other ants in case of a ....
   a. mating season b. nearby danger
   c. lack of food d. lack of water
5. .... use a technological system to communicate.
   a. Humans b. Ants
   c. Bats d. Humpback whales
6. Animals can communicate with each other by ....
   a. producing sounds b. talking
   c. writing symbols d. sending emails
7. Humpback whales sing different tones for all the following purposes, except ....
   a. mating b. feeding
   c. heating d. communication
8. Humpback whales sing during ...... months, which is the mating season.
   a. winter b. summer
   c. spring d. autumn
9. All the following have a super sense of hearing, except ....
   a. humpback whales b. bats
   c. humans d. dolphins

10 .... is a property used by dolphins and bats to locate their prey.

a. Countershading b. Camouflage

c. Echolocation d. Panting

11 Bats and canes of blind people produce ....-pitched sounds.

a. very low b. low c. medium d. high

12 All of the following use the echolocation property to locate things, except ....

a. blind people's canes b. bats

c. owls d. dolphins

13 .... can change echo into vibrations.

a. Bats b. A blind person's cane

c. Dolphins d. Jerboas

14 Bats use their strong sense of .... to detect echo.

a. sight b. smell c. hearing d. touch

15 Blind people use their sense of .... to pick up echo through the cane.

a. hearing b. sight c. smell d. touch

16 Both bats and special canes ....

a. can change echo to vibrations b. can't change echo to vibrations

c. produce high-pitched sounds

d. detect echo using their hearing sense

2 Complete the following sentences from the words between the brackets:

1 Ants depend on their sense of .... to communicate. (smell - sight)

2 Nurse ants send a smelly message in case of a .... of food. (plenty - shortage)

3 Humpback whales communicate by their sense of .... (hearing - sight)

4 Women's voices are .... in pitch than these of men. (lower - higher)

5 Sounds produced by humpback whales in the mating season are .... in pitch than those produced in the feeding season.

(different - similar)

6 In a blind person's cane, the echo is turned into ....

(flashlight - vibrations)

7 The pitch produced by a blind person's cane is too .... to be heard by their ears.

(high - low)

8 The a blind person can feel the vibrations picked up by his cane through his ....

(ears - thumb)

9 When the sound bounces off a solid object, a/an .... is produced.

(shadow - echo)

3 Put (✓) or (✗):

1 Ants can detect the sweetness of food by their sense of smell. ( )

2 Groups of ants have the same role in the same colony. ( )

3 Scout ants are responsible for alarming the colony in danger. ( )

4 Solider ants protect the hive from any danger nearby. ( )

5 Humpback whales change their sound pitch according to the season. ( )

6 Humpback whales can sing underwater. ( )

7 Humpback whales communicate with each other through flashing. ( )

8 Men have a high-pitched and rough sound. ( )

9 The special cane emits a low-pitched sound. ( )

10 The special cane can help a deaf person locate things. ( )

11 Without their strong sense of hearing, bats will die. ( )

4 Complete the following sentences using the words between the brackets:

(sight - Humpback whales - Bats - light - sound - smell - blind person's cane)

1 A .... is a technology inspired by the adaptation in bats.

2 .... can't convert echo into vibrations.

3. A blind person isn't be able to use his sense of ....
4. Echolocation depends on .... energy.
5. .... change their songs' sound pitch according to the seasons.
6. Ants depend on their sense of .... to communicate.

5 Write the scientific term:

1. A place where groups of ants perform different roles.
2. It's the sense that helps ants communicate together.
3. It's the sense used by a blind person to detect echo in his cane.
4. It's the sense used by bats to detect echo.
5. Ants that send a smelly message to alert the scout ants to search for food.
6. Ants that are responsible for finding the food resources outside the colony.
7. Ants that send smelly messages in case of side a danger nearby.
8. Living organisms sing a wide range of tones underwater to communicate.
9. A property that is used by dolphins and bats to locate their prey in the dark.
10. A special device that is used by a blind person to locate things nearby.

6 Cross out the odd word:

1. Texting – Sending an email – Echolocation – Writing
2. Acacia trees – Kapok trees – Ants – Bats
3. Humpback whales – Mongooses – Ants – Dolphins
4. Man – Woman – Sharp voice – High-pitched sound
5. Bats – Blind people cane – Humpback whales – Owls
6. Bats – Humpback whales – Dolphins – Ants

7 Classify the following according to the sense that the living organism uses to communicate or locate things:

Humpback whales – Ants – Bats – A blind person's cane

Hearing sense	Smell sense	Touch sense
....	....	....

8 Study the following figures, then complete:

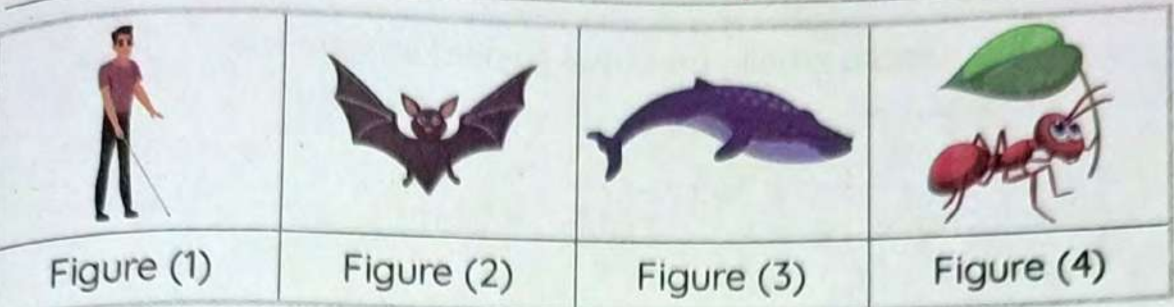
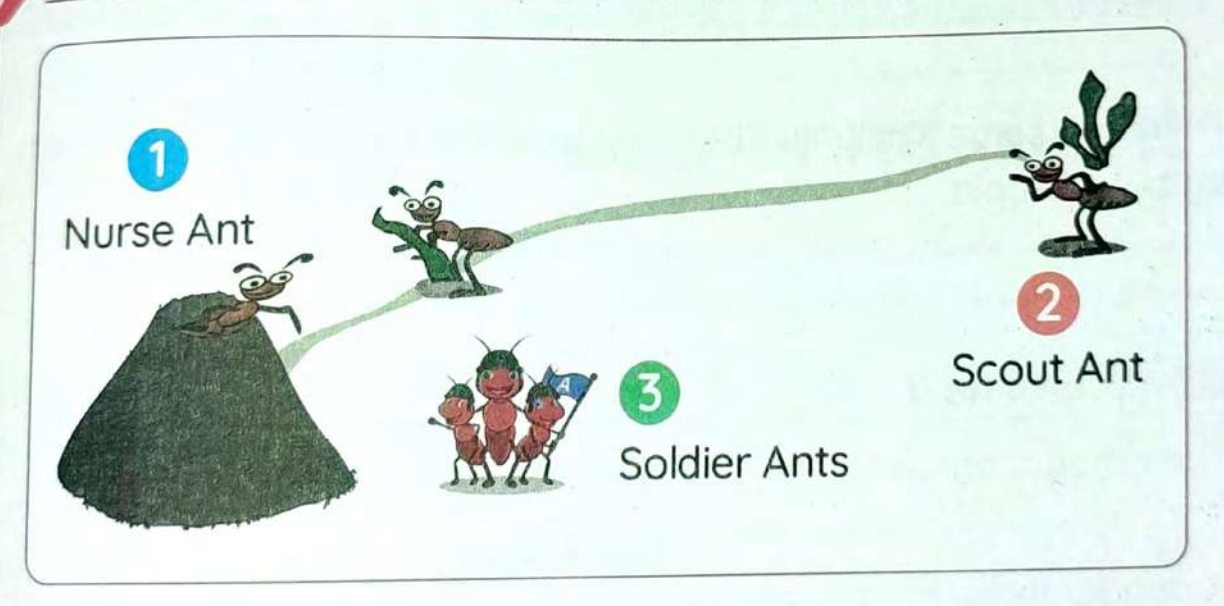


Figure (1)	Figure (2)	Figure (3)	Figure (4)

1. Figure (........) can use technological systems to communicate.
2. Figure (........) uses his/her touch sense to detect echo.
3. Figure (........) uses its hearing sense to detect echo.
4. Figure (........) uses its smell sense to communicate.
5. Figure (........) can attract mates by singing underwater.
6. Figure (........) represents a technological tool inspired from nature.

9 Study the following figure, then put (✓) or (✗):



1. Ant number (2) has different role than ants number (3). ( )
2. Ants number (3) work together to protect the colony from any danger. ( )
3. Ant number (2) alert ant number (1) if the food is low. ( )
4. Ants have developed systems that help them divide their work. ( )

10 Give reasons for:

1. Nurse ants send a smelly message to alert scout ants.

....

....

2. Scout ants have a great role in the ant world.

....

....

3. Sometimes solider ants send smells to other ants.

....

....

4. Bats use their ears to "see" in the dark.

....

....

5. A special cane helps a blind person to walk alone.

....

....

6. There are some similarities between bats and the special canes used by blind people.

....

....

11 What happens if:

1. The amount of food in the colony is low.

....

2. A danger threatens the colony.

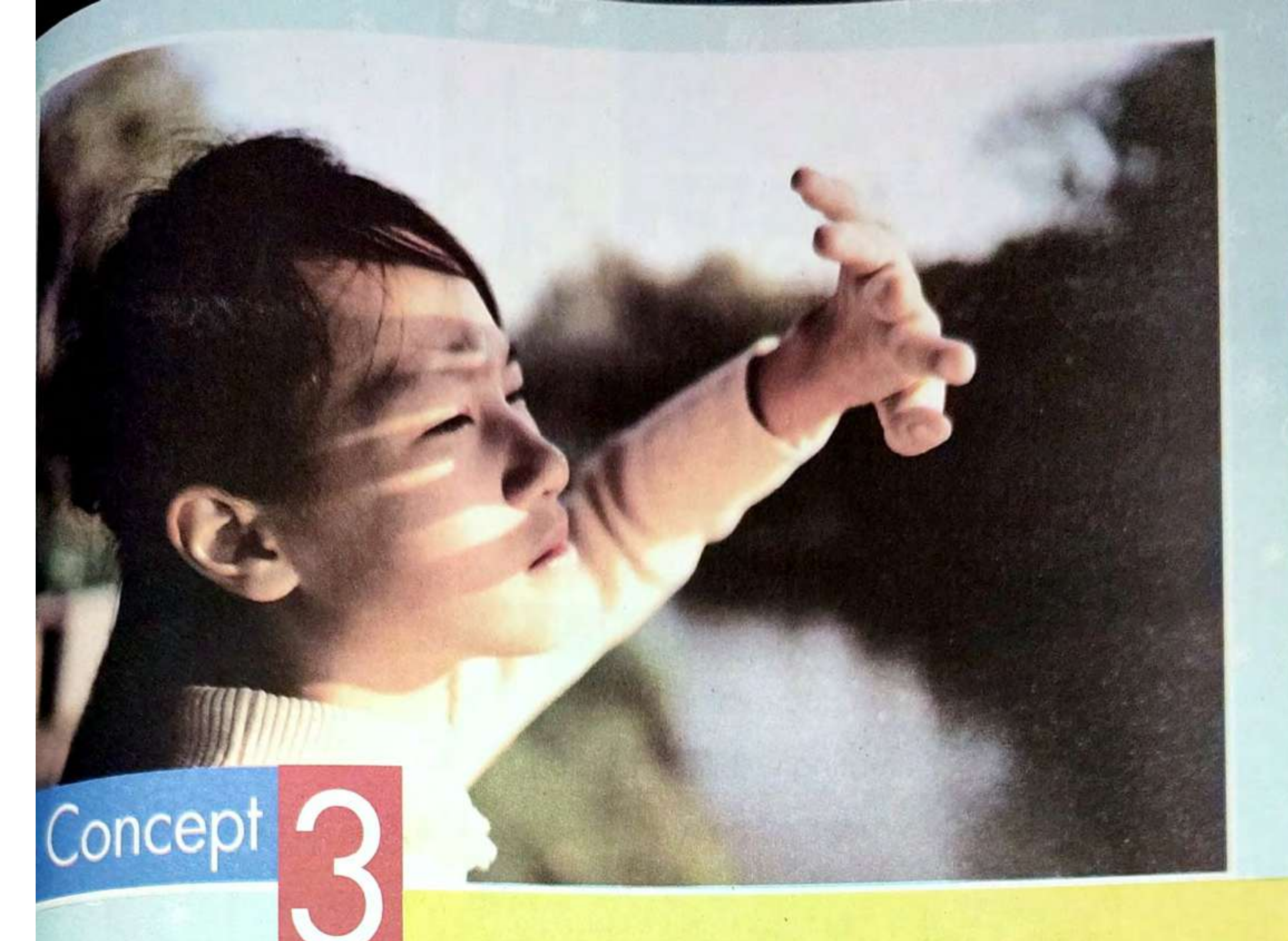
....

3. Bats have a weak sense of hearing.

....

4. The cane of a blind person picks up an echo.

....



Concept 3

Light and Sight

Concept Objectives:

By the end of this concept, students will learn about:

- Examples of nocturnal animals.
- Special structure of the eyes of nocturnal animals.
- Sources of light.
- Light reflection.
- Types of objects around us.
- How vision occurs.

Key Vocabulary:

- Feature
- Pupil
- Light
- Reflect
- Transparent
- Opaque

Concept 3

Light and Sight

Lesson 1	
Activity 1	Can you explain?
Activity 2	Hunting with Night Vision
Activity 3	What Do You Already Know About Light and Sight?

Lesson 2	
Activity 4	Light Reflection
Activity 5	Light Strikes Matter

Lesson 3	
Activity 6	Firefly Light Show
Activity 7	What Do You Already Know About Communication and Information Transfer?

Lesson 4	
Activity 8	Transferring Information
Activity 9	Review: Communication and Information Transfer

Lesson 1

Activity 1 Can You Explain?

» Tick (✓) the correct answer:

1. Humans need .... to see what is happening around them.
   - ◯ sound
   - ◯ heat
   - ◯ light
2. The .... is the organ that is affected by light in the human body.
   - ◯ ear
   - ◯ eye
   - ◯ nose

» In low-light areas, humans can't see clearly and need more light.

» In dark areas, humans can't see anything and depend on other senses.

- في الأماكن منخفضة الإضاءة لا يستطيع الإنسان الرؤية بشكل جيد، ويحتاج للمزيد من الضوء.
- في الأماكن المظلمة لا يستطيع الإنسان الرؤية تمامًا، ويمكنه استخدام الحواس الأخرى.

- Humans need a source of light to see clearly.
- The eye senses the light, and the brain tells you what you are seeing.

- يحتاج الإنسان لمصدر ضوء ليرى بشكل جيد.
- تشعر العين بالضوء ويخبرك المخ بما تراه.



- Some animals can see better than humans in the dark, such as the fishing cat.

- بعض الحيوانات تستطيع أن ترى أفضل من الإنسان في الظلام مثل القط السماك.



Activity 2 Hunting with Night Vision

Night Vision in Humans



- Human eyes need a source of light to see objects clearly.

. تحتاج أعين الإنسان للضوء لرؤية الأشياء بوضوح.



- Without light, humans would need night vision goggles to see in the dark.

. بدون الضوء قد يحتاج الإنسان لنظارات خاصة بالرؤية الليلية ليرى في الظلام.

- Fishing cats have a structural adaptation that allows them to have excellent night vision to hunt successfully in the dark.

Fishing Cat القط السماك



- It is a wild cat that hunts for food at night.
- Its eyes seem to glow in the dark. 

  - Because it has a mirror-like membrane on the back of its eye, that reflects light entering the eye and allows it to collect more available light.

- هو قط بري يصطاد في الليل.
- تتوهج (تلمع) عيون القط السماك في الظلام.
- وذلك لأنه يملك غشاءً رقيقًا كالمرآة في مؤخرة العين تعمل على ارتداد الضوء من الغشاء ليسمح للعين بتجميع أكبر قدر ممكن من الضوء.

» Nocturnal animals can see better than humans in the dim light.

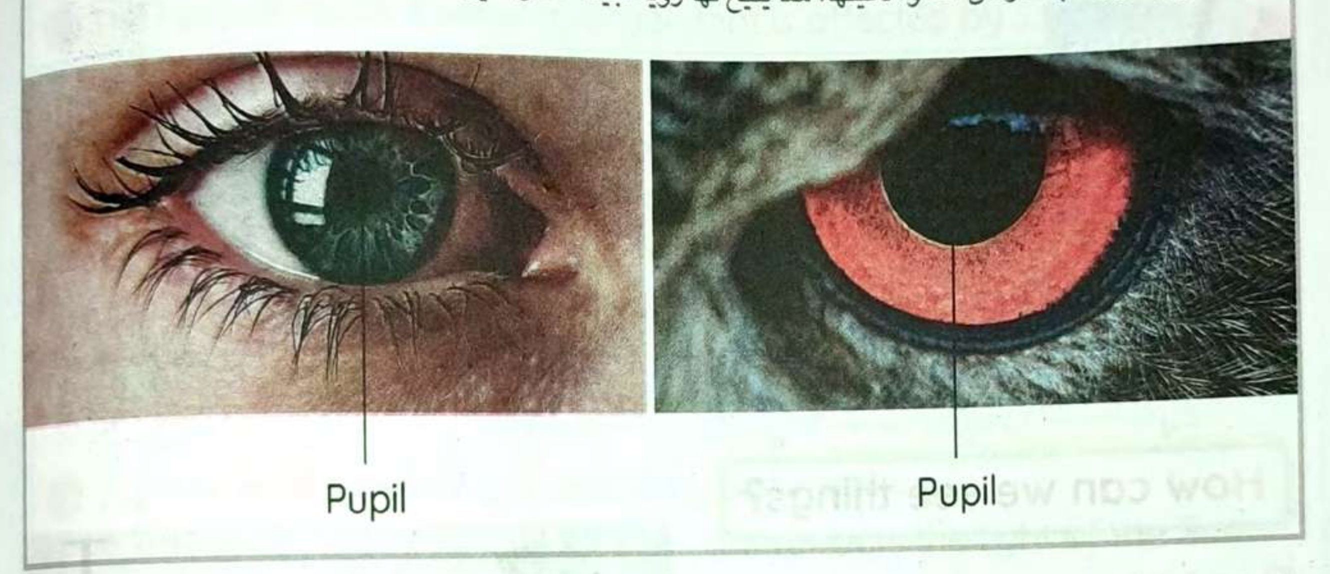
• ترى الحيوانات الليلية بشكل أفضل من الإنسان في أضعف درجات الضوء.

• Nocturnal animals have bigger eyes than humans.
• The pupils of the eyes of nocturnal animals open wider than the pupils of human eyes. G.R

– To allow more light to enter their eyes to see well at night.

• أعين الحيوانات الليلية أكبر من عين الإنسان.
• حدقة العين للحيوانات الليلية أكثر اتساعًا من الإنسان

لتسمح بمرور أكبر قدر من الضوء لأعينها؛ مما يتيح لها رؤية جيدة خلال الليل.



Nocturnal Animals

» In the weakest light levels (dim light), they can see their surroundings well.

» In complete darkness, they depend on other senses, such as hearing, smell, and touch.

• تستطيع الحيوانات الليلية رؤية البيئة من حولها بأقل مستوى ضوء ممكن.
• تعتمد الحيوانات الليلية في الظلام على بعض الحواس الأخرى كالسمع والشم واللمس.

Unit 1

Activity 3 What Do You Already Know About Light and Sight?

Source of Light It's something that emits (gives off) its own light.

مصدر الضوء: الشيء الذي ينبعث منه ضوءه الخاص.

The Sun	Electric Lamp	Fire	Flashlight	Candle
				



Notes:

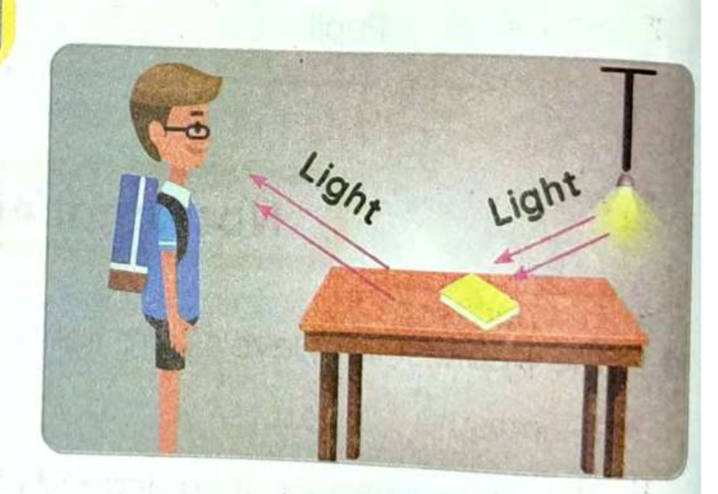
- The moon, is like mirrors, is not considered a source of light. G.R
  - Because the moon doesn't emit its own light, but it reflects the sunlight falling on it.

• القمر كالمرآة ليس مصدرًا من مصادر الضوء؛ لأنه لا ينبعث منه ضوءه الخاص، ولكنه يعكس الضوء الساقط عليه.



How can we see things?

1. Light falls on the object.
2. Light is reflected on our eyes.
3. Structures in human eyes transmit messages to the brain that form a picture about what we see.



• يسقط الضوء على الأجسام وينعكس إلى أعيننا.

• تنقل التراكيب الموجودة في عيون الإنسان رسائل إلى المخ لنستطيع تمييز ما نراه.

» Light is a visible form of energy that travels in the form of waves.

Exercises on Lesson 1

1 Choose the correct answer:

1. The eyes of .... seem to glow in the dark.
   a. humans b. cats c. bats d. snakes
2. Each of the following is considered a source of light, except ....
   a. the fire b. the Sun c. the lamp d. the eye
3. The mirror-like membrane at the back of a cat's eyes .... the light falling on it.
   a. refracts b. absorbs c. reflects d. scatters
4. The human eye is a sensory organ that is affected by ....
   a. sound b. heat c. light d. taste
5. Humans can use .... to be able to see in complete darkness.
   a. special glasses b. night vision goggles
   c. magnifying lens d. binocular
6. Which is the correct sequence that represents the vision?
   a. Object → eye → light b. Eye → object → light
   c. Light → eye → object d. Light → object → eye
7. The moon appears bright and shiny because ....
   a. it emits its own light b. it refracts the light of the Sun
   c. it reflects the light of the Sun d. it is a natural source of light
8. Which of the following is a source of light?
   a. Eye b. The moon c. Fire d. Mirror
9. The pupils of nocturnal animals open .... the pupils of humans.
   a. wider than b. similar to
   c. narrower than d. smaller than
10. The .... inside the eye controls the amount of light that enters the eye.
    a. cornea b. lens c. membrane d. pupil
11. In complete darkness, many nocturnal animals can detect the environment by all the following senses, except their .... sense.
    a. hearing b. touch c. sight d. smell

12 The .... system has an important role in vision.
a. respiratory b. nervous c. digestive d. circulatory

13 .... energy is a visible form of energy that our eyes can detect.
a. Heat b. Sound c. Light d. Electrical

14 The .... can reflect the light that falls on it/them.
a. mirror b. moon c. flashlight d. a and b

2 Complete the following sentences from the words between the brackets:

1. The eyes of fishing cats are considered a .... adaptation. (structural - behavioral)
2. Humans can use .... to see at complete darkness. (night vision goggles - binoculars)
3. Humans and cats have .... abilities to see at night. (similar - different)
4. The .... system helps humans detect objects in a luminous room. (nervous - respiratory)
5. .... waves affect our eyes causing vision. (Sound - Light)
6. The .... appears bright as it reflects the sunlight falling on it. (moon - electric lamp)
7. The pupils of nocturnal animals' eyes open widely for .... light to enter. (more - less)
8. Most nocturnal animals can see .... than humans at night. (better - weaker)
9. In dim light, ... can see a moving animal clearly. (humans - cats)
10. Cats' eyes are adapted to night vision due to the presence of .... behind their eyes. (a mirror-like membrane - pupils)
11. Humans can see less clearly in the .... (dark - dim light)
12. Vision occurs due to the .... of light. (reflection - refraction)

3 Put (✓) or (✗):

1. Both humans and animals need a source of light to see. ( )
2. The moon is a source of light. ( )
3. Some animals can see in the dark, such as wild cats. ( )
4. The eye is the organ that is affected by the light in the human body. ( )

5. The human eye can see objects because it emits its own light. ( )
6. A fishing cat has a mirror-like membrane in front of the eye. ( )
7. Humans need night vision goggles to see objects in the darkness. ( )
8. Hunting at night for nocturnal animals is considered a behavioral adaptation. ( )
9. Nocturnal animals have eyes that are larger than humans' eyes. ( )
10. The pupils in the human eyes open narrower than these of cats. ( )
11. In a cat's eyes, the pupils open widely to allow less light to enter the eyes. ( )
12. The nervous system is very important for seeing and hearing. ( )
13. It is much easier for humans to see objects in dim light than in full light. ( )

4 Complete the following sentences using the words between the brackets:

(mirror - brain - moon - sound - humans - light - Cats - eyes)

1. .... have an excellent night vision, but .... have a poor night vision.
2. Both the .... and the .... reflect the light falling on them.
3. Fishing cats depend on the reflection of .... waves, but dolphins depend on the reflection of .... waves to navigate their surroundings.
4. Light affects the sensory receptors in the .... that send a signal to the ....

5 Write the scientific term:

1. They're animals that are adapted to be active at night.
2. Wild cats whose eyes look shiny at night.
3. The visible form of energy that is necessary for vision.
4. The object that emits its own light.
5. A special tool that humans use to see objects in complete darkness.

6 Cross out the odd word:

1. Fishing cat - Bat - Owl - Panther chameleon
2. Candle - Flashlight - Moon - Electric lamp

Unit 1

7 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Bats	a. can locate their prey in dark water.
2 Cats	b. have a membrane at the back of their eyes allowing them to see at night.
3 Owls	c. detect the sound reflected from mosquitoes.
4 Dolphins	d. have bowl-shaped faces and feathers on their heads.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 A human	a. has eyes that glow in the dark.
2 An owl	b. uses night vision goggles to see things in the dark.
3 A bat	c. can turn its head in all directions.
4 A fishing cat	d. is a mammal that uses echo to hunt.

1 .... 2 .... 3 .... 4 ....

C

Column (A)	Column (B)
1 The brain	a. send messages to the brain through the nerves.
2 The nerves	b. control the light that enters the eye.
3 The human eyes	c. reflects the light rays that fall on it.
4 The pupils	d. translates and processes information.
5 The mirror-like membrane	e. transmit messages between the brain and the eye.

1 .... 2 .... 3 .... 4 .... 5 ....

Concept 3

8 Study the following figures, then answer the questions below:

1 Which of these following figures represents the correct vision in humans?

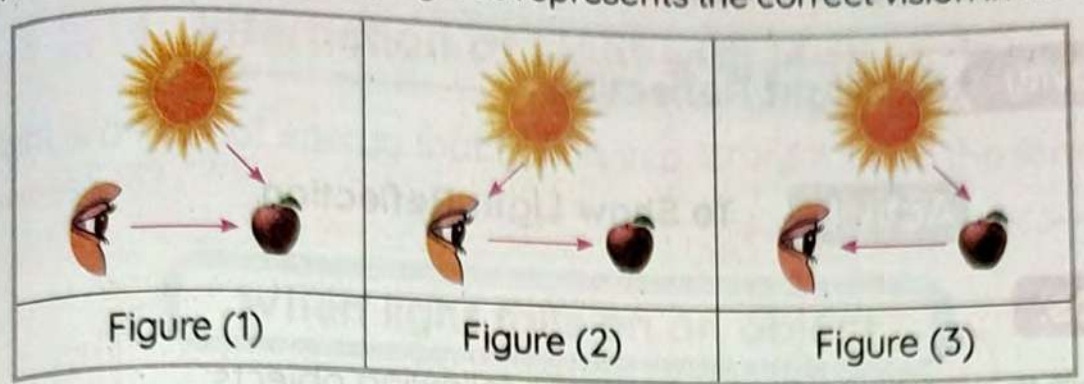


Figure (1)	Figure (2)	Figure (3)

2 The following figures represent two shiny objects appearing in the sky at day or at night. Study these figures, then complete the following sentences:

a. Figure (..........) is not a source of light, but it reflects the light of figure (..........) that falls on it.

b. Figure (..........) is the natural source of light.

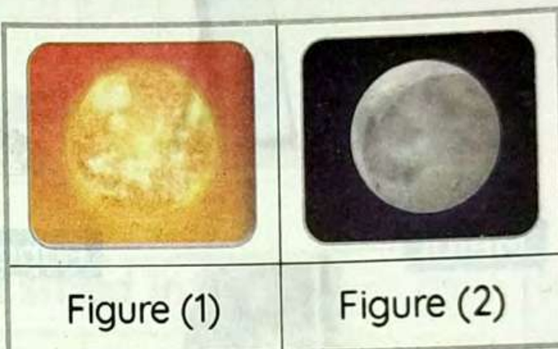


Figure (1)	Figure (2)

9 Give reasons for:

1 Unlike humans, some nocturnal animals can see at night.

2 A fishing cat's eyes seem to glow in the dark.

3 Although the moon is shiny, it isn't a source of light.

4 The pupils of the nocturnal animals' eyes open wider than humans eyes.

10 What happens if:

1 The fishing cat doesn't have a mirror-like membrane in its eyes?

2 Light falls on objects around us?

3 Humans' eyes have a mirror-like membrane, like fishing cats?

Lesson 2

Unit 1

Activity 4 Light Reflection

Activity To Show Light Reflection

Steps:

» Direct the light of a flashlight on the following objects:



Observations:

» Shiny (smooth) materials, such as mirrors and metals, reflect most of the light rays that fall on them.

» Rough materials, such as wood, clothes, and papers, reflect small amount of the light rays that fall on them.

Conclusion:

» Shiny (smooth) materials reflect light better than rough materials.

» Light reflection is the bouncing of light rays when they fall on a reflecting surface.

Activity 5 Light Strikes Matter

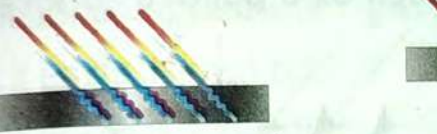
Interaction of Light with Matter

» Light is a form of energy that travels in a straight line in the form of waves.

يعد الضوء من إحدى صور الطاقة وينتقل في خطوط مستقيمة على شكل أمواج.

When light falls on an object

Some light may be absorbed	Some light may pass	Some light may be reflected
يمتص الجسم بعض الضوء	يمر بعض الضوء عبر الجسم	يعكس الجسم بعض الضوء







Materials are classified into:

Transparent Materials

الأجسام الشفافة

- They are the materials that allow light to pass through.
- Things can be seen behind them.
- They don't have shadows.

Opaque Materials

الأجسام المعتمة

- They are the materials that don't allow light to pass through.
- Things can't be seen behind them.
- They have shadows.

Examples

- Air – Water – Window – Lenses





- Human body – Wood – Metal





Give a reason for...





- Shadow is formed when light falls on an opaque object.

Because light is absorbed or reflected and can't pass through it.



Why does the light reflection depend on the smoothness of the surface





Smooth Surface such as a mirror	Rough Surface such as a painted surface

What happens if...?

Ligh falls on a smooth surface.	Light falls on a rough surface.
- Light rays are reflected in the same direction. • عندما يسقط الضوء على سطح ناعم، فإن أشعة الضوء تنعكس في نفس الاتجاه.	- Light rays are scattered (diffused) in different directions. • عندما يسقط الضوء على سطح خشن، فإن أشعة الضوء تتشتت في اتجاهات مختلفة.

Check your understanding?



Your elder sister dropped her cell phone, and now the screen has a few cracks. How do you predict that light will be reflected from the screen?

....

Exercises on Lesson 2

1 Choose the correct answer:

1. What features of light helps you see yourself in the mirror?
   a. Refraction b. Shadow c. Rainbow d. Reflection
2. Light travels in .... lines.
   a. curved b. straight c. zigzag d. opposite
3. Reflection of light requires ....
   a. a flashlight b. a radio c. a mirror d. a and c
4. .... is /are an example of a light-reflecting material.
   a. Wood b. Mirrors c. Plastic d. Papers
5. The moon appears shiny in the sky at night because ....
   a. it emits its own light
   b. it allows sunlight to pass through it
   c. it absorbs sunlight that falls on it
   d. it reflects sunlight that falls on it
6. Mirrors make the falling light rays ....
   a. pass through it
   b. reflect in different directions
   c. reflect in the same direction
   d. diffuse like those of rough surfaces
7. .... are considered transparent objects.
   a. Metals b. Lenses c. Mirrors d. Papers
8. All the following are transparent materials, except ....
   a. glass b. air c. wood d. lenses
9. Which of the following materials does not form a shadow when light falls on it?
   a. Wood b. Glass c. Carton d. Tree
10. All the following materials are opaque, except ....
    a. wood
    b. the human body
    c. water
    d. iron
11. Which of the following allows light to pass through it?
    a. Rock b. The moon c. Wood d. Glass

12 When light falls on a dark surface, ...

a. the surface absorbs the light
b. the light passes through it
c. the light is refracted
d. nothing happens

13 All the following are considered rough surfaces, except ....

a. wood
b. clothes
c. mirror
d. paper

14 All the following reflect the light rays that fall on them, except the ....

a. moon
b. mirror
c. flashlight
d. metal

15 A .... reflects most of the light rays that fall on it.

a. plastic spoon
b. metallic spoon
c. wooden spoon
d. piece of rock

16 A piece of clothes is considered a ....

a. source of light
b. transparent medium
c. smooth surface
d. rough surface

17 All of these materials are opaque objects, except the ....

a. wood
b. lenses
c. human body
d. metals

18 You can see your friend clearly if he stands behind a ....

a. glass window
b. shiny mirror
c. wooden door
d. metallic door

19 The object in figure .... is considered a transparent medium.

a.
b.
c.

20 .... surfaces scatter and diffuse light rays.

a. Shiny
b. Smooth
c. Rough
d. Polished

2 Complete the following sentences from the words between the brackets:

1 When sunlight falls on an opaque object, a .... is formed. (rainbow – shadow)

2 Light can pass through .... (a brick – glass)

3 You can see a ball found inside a .... box. (wooden – glass)

4 .... is a transparent liquid material. (Water – Air)

5. When light rays fall on a ...., they are scattered in many directions. (paper - mirror)
6. A polished mirror reflects .... of the light rays falling on it. (most - some)
7. Air and water are .... materials. (transparent - opaque)
8. Light does not pass through .... materials. (transparent - opaque)
9. .... is one of the opaque objects. (Carton - Glass)
10. When light falls on a piece of wood, a .... amount of light is reflected. (small - large)
11. A rough surface .... the light rays falling on it. (scatters - collects)
12. Smooth surfaces reflect light in .... direction(s). (the same - different)
13. The mirror-like membrane in the cat's eyes is considered a .... surface. (rough - smooth)
14. A shadow is formed when light falls on .... (glass - a tree)

3 Put (✓) or (✗):

1. Light reflection depends on the smoothness of the object's surface. ( )
2. Shiny objects include mirrors, metals, and wood. ( )
3. The moon is considered a reflecting surface, such as a mirror. ( )
4. Wood is a transparent object that allows light to pass through it. ( )
5. The wooden board reflects less light than the mirror. ( )
6. The opaque materials do not let the light pass through. ( )
7. A painted surface reflects light in one direction. ( )
8. Shadows are formed when light hits a transparent object. ( )
9. A sheet of glass allows light rays to pass through it. ( )
10. If I can see my face clearly on a surface, this means that it is a smooth, shiny surface. ( )
11. The human body forms a shadow when light falls on it. ( )
12. Air and water are considered transparent materials. ( )
13. Light waves travel in the air in the form of curved lines. ( )
14. Opaque objects absorb some of the light falling on them and reflect the rest of the rays. ( )

4 Complete the following sentences using the words between the brackets:

(opaque - more - less - shadow - mirror - transparent)

1. Most of the light is reflected in one direction when it falls on a ....
2. A mirror reflects .... light than a piece of wood.
3. Glass is a/an .... object, but the human body is a/an .... object
4. When putting an opaque object between a flashlight and a wall, a .... is formed.

5 Write the scientific term:

1. The bouncing of light rays when they fall on a reflecting surface.
2. The materials that allow most light to pass through.
3. Materials that don't allow light to pass through.
4. They are surfaces that reflect the light rays in one direction.
5. A type of surface that reflects light in different directions.
6. A dark area that is formed when light falls on an opaque object.

6 Cross out the odd word:

1. Clothes - Paper - Mirror - Wood
2. Air - Human body - Water - Glass
3. Lenses - Wood - Skin - Paper

7 Classify the following materials into transparent and opaque materials:

1. A wooden chair (.........)
2. An aluminum pot (.........)
3. Air (.........)
4. Glasses of glass (.........)

8 Classify the following materials in these tables below:

1 Rock - Glass - Window - Wood - Skin - Milk - Clear water

Transparent Mediums	Opaque Mediums
....	....
....	....

2 Mirror - Cloth - Metal - Wood - Paper

Smooth Surfaces	Rough Surfaces
....	....
....	....

9 Choose from column (A) what suits it in column (B):

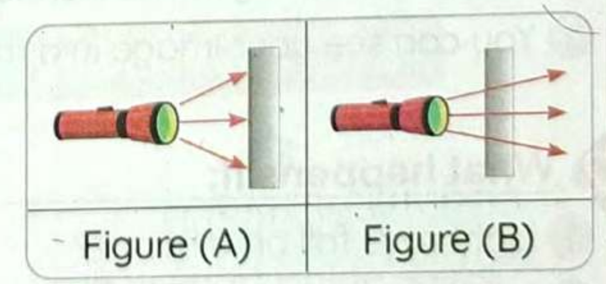
Column (A)	Column (B)
1 The Sun	a. reflect light rays in one direction.
2 Shadows	b. is shiny but is not considered a source of light.
3 The moon	c. is a light source.
4 Smooth surfaces	d. are formed when light strikes a human body.

1 .... 2 .... 3 .... 4 ....

10 Answer the following questions:

1 Look at the path of the light rays in figures (A) and (B), then answer:

Determine which of the two figures is opaque and which is transparent.



a. Figure (A) is ....

b. Figure (B) is ....

2 Which of the following surfaces represents the reflection of light rays from a wooden surface, and what is the reason?

Figure (A)	Figure (B)

....

3 Your friend wants to prevent the light from entering his room. Suggest to him some materials that he can use on the window to prevent the light from entering his room.

....

4 The opposite figures represent a girl standing behind two different objects. Put (✓) or (✗):

Figure (A)	Figure (B)

a. Figure (A) represents a reflecting surface. ( )

b. Figure (B) represents an opaque surface. ( )

c. Figure (A) allows most light to pass through. ( )

5 The opposite figure represents the formation of a shadow. Complete:

a. The human body is considered a/an .... medium.

b. The formation of a shadow requires .... and ....

11 Give reasons for:

1 Air is considered a transparent medium.

2 The human body forms a shadow when light falls on it.

3 You can see your image in a mirror, but you can't see it on a paper.

12 What happens if:

1 Light rays fall on a mirror?

2 Light rays fall on opaque object?

Lesson 3

Activity 6 Firefly Light Show

Fireflies Communication



Habitat: They live on mangroves in Thailand.

- Fireflies are not flies. They are actually winged beetles.
- Fireflies produce a chemical reaction inside their bodies that allows them to light up.

Fireflies use their wings to flash at regular periods of time (intervals) to


1. warn off predators.


2. attract a mate.

• يحدث تفاعل كيميائي داخل أجسام الخنافس مما يجعلها تضيء.
• تستخدم الخنافس الأجنحة لإطلاق ومضات ضوء على فترات منتظمة من أجل:
1 التحذير من قدوم حيوانات مفترسة. 2 جذب الجنس الآخر من أجل التكاثر.

What happens if...



- There is another group of fireflies flashing nearby?
  1. Fireflies will stop flashing their own patterns.
  2. They will start to match the pattern of the other group.

ماذا سيحدث لو: كانت هناك مجموعة خنافس مضيئة أخرى بالقرب منها؟
• ستتوقف عن النمط الذي تومض به، ثم تقلد نمط المجموعة الأخرى للتواصل معها.

Humans can use light to communicate, such as

1. Traffic lights
2. Lighthouses are used to guide ships.

Unit 1

Activity 7 What Do You Already Know About Communication and Information Transfer?

» There are some **similarities** and **differences** between humans and animals in communication and transferring information.







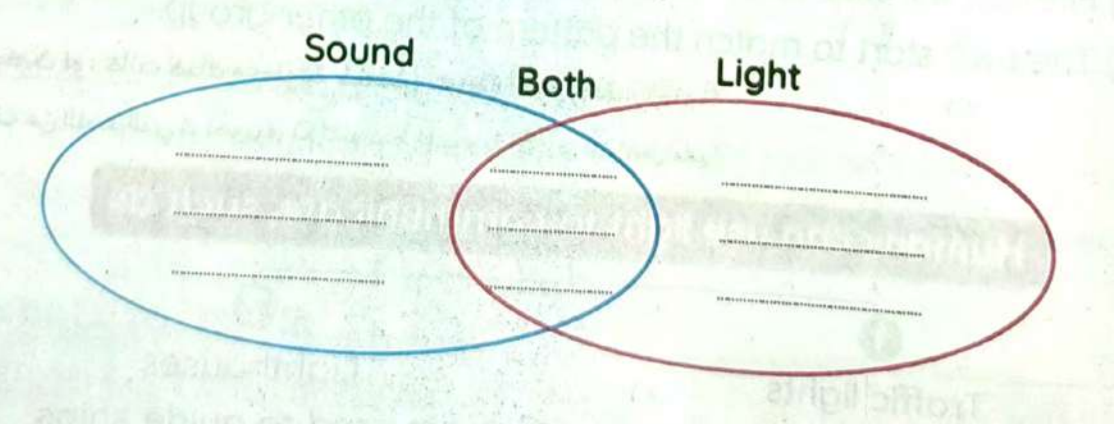
Humans	Both	Animals
• Writing • Reading • Language • TV - Cell phones • An electronic reader	• Displaying light • High-pitched sound	• Echolocation

Check your understanding?



» **Use the following living organisms to fill the gaps:**

Human - Humpback whale - Firefly - Monogoose



Exercises on Lesson 3

1 Choose the correct answer:

1. Reading and writing are common types of communication in ________ .
   a. animals b. plants c. humans d. birds
2. Animals can communicate with each other through ________ .
   a. sound and light b. traffic lights
   c. reading d. writing
3. Fireflies could be found in the same habitat of the ________ .
   a. palm tree b. cactus c. acacia tree d. mangrove tree
4. A firefly is not a bird, but it is a type of ________ .
   a. amphibians b. lizards c. beetles d. reptiles
5. Changing the pattern of light in a firefly is an example of ________ adaptation(s).
   a. structural and behavioral b. physical and behavioral
   c. structural d. behavioral
6. ________ produce a chemical reaction inside their bodies.
   a. Butterflies b. Firefly beetles c. Houseflies d. Owls
7. Fireflies light up their wings for all the following reasons, except ________ .
   a. warning off predators b. communicating together
   c. attacking predators d. attracting a mate

2 Complete the following sentences from the words between the brackets:

1. Fireflies light up due to a ________ reaction in their bodies. (physical – chemical)
2. Fireflies are ________ beetles. (winged – wingless)
3. The ability of fireflies to light up is a ________ adaptation. (structural – behavioral)

4. Changing the flash pattern in fireflies is a .... adaptation. (structural - behavioral)

5. Fireflies depend on their sense of .... to communicate together. (hearing - sight)

6. The .... (tail - wings) of fireflies light(s) up to attract a .... (predator - mate)

3 Put (✓) or (✗):

1. Fireflies can communicate with each other using sound energy. ( )
2. Both humans and animals use light and sound to communicate. ( )
3. Fireflies light up their wings to warm their bodies. ( )
4. The wings of fireflies flash due to a biological reaction inside their bodies. ( )

4 Write the scientific term:

1. It's a kind of beetles that light up their wings.
2. It's a living organism that communicates by cell phones.

5 Cross out the odd word:

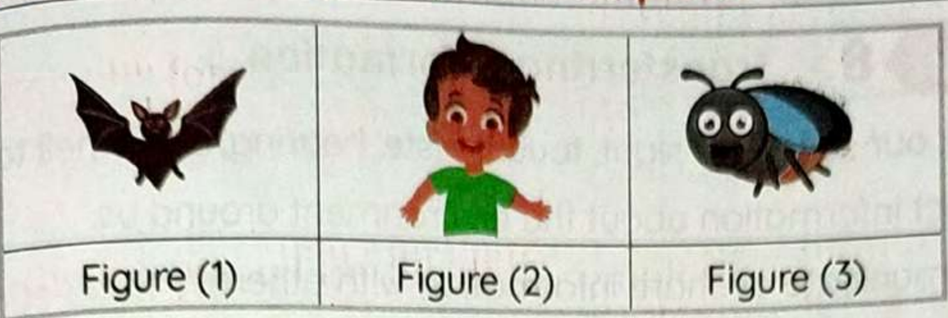
1. Bats - Fireflies - Dolphins - Humpback whales
2. Humans - Reading - Writing - Animals - Speaking
3. Traffic lights - Reading - Lighthouses - Echolocation

6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Humans	a. hunt mosquitoes by using echo.
2 Bats	b. light up their wings to attract a mate.
3 Dolphins	c. can communicate by writing and reading.
4 Fireflies	d. detect the sound reflected from fish.

1 .... 2 .... 3 .... 4 ....

7 Study the following figures, then complete:



1. Figures (......) and (......) communicate by light.
2. Figures (......) and (......) communicate by sound.
3. Figure (......) has a strong sense of hearing.
4. Figure (......) can communicate by cell phone.
5. Figure (......) lights up its wings to attract a mate.
6. Figure (......) has poor night vision but can still hunt at night.

8 Give reasons for:

1. Fireflies light up their wings.

....

....

2. The ability to communicate using writing separates humans from animals.

....

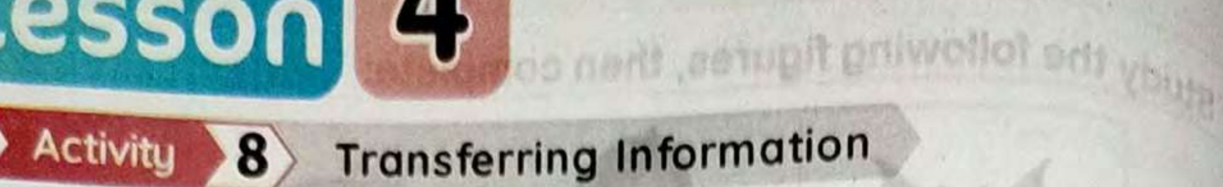
....

9 What happens if:

- There's another group of fireflies flashing nearby?

....

....



Activity 8 Transferring Information

Unit 1

- We use our senses of sight, touch, taste, hearing, and smell to:
  1. Collect information about the environment around us.
  2. Communicate or share information with others.
- Your ears detect sound energy. Your eyes detect light energy.

Examples of information that the eyes receive

1. You see your friend waving.



رؤية صديق يلوح لك بيده.

2. A car stops when seeing a red traffic light.



توقف السيارة عند رؤية إشارة المرور حمراء.

3. Using a rescue flare to get help.



استخدام شعلة إنقاذ لطلب المساعدة.

4. Hikers use mirrors to attract rescue helicopters.



استخدام الرحالة المرايا لجذب طائرات الهليكوبتر لإنقاذهم.



Note:

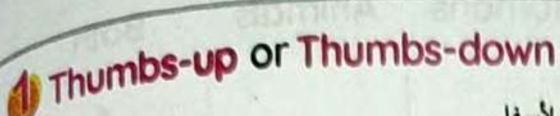
- In the past, humans used signal fires to communicate from a distance.
- اعتاد الناس قديمًا إشعال النار واستخدامها للتواصل على مسافات طويلة.

Humans use codes to transmit information.

- يستخدم الإنسان الشفرات في نقل المعلومات.

Code: It is a pattern that has a meaning.

الشفرة: هي نمط له معنى.

 **1 Thumbs-up** or **Thumbs-down** • رفع الإبهام لأعلى أو خفضه لأسفل.	
2 Facial expressions: They help people know what we feel. • تعبيرات الوجه تساعد الناس على معرفة ما نشعر به.	
3 Language: It is a code in the form of sound. Different languages have different codes, but they transmit information. • اللغة هي وسيلة للتواصل في شكل طاقة صوتية. • اللغات المختلفة لها شفرات مختلفة، ولكنها تنقل المعلومات.	
4 Writing: It is a code in the form of symbols or arranged letters giving a specific meaning. • الكتابة هي طريقة للتواصل في شكل رموز أو حروف تُعطي معنًى معينًا.	
5 Music or sounds: They are used to encode messages. • يمكن استخدام الموسيقى أو الطبول في إرسال الرسائل.	
6 Lighthouses: They encode information in flashes to tell sailors where they are. • تقوم المنارات بإرسال رسائل (ومضات ضوئية) للبحَّارة في السفن.	

- Sense organs receive information and send it to the brain.
- The brain **decodes** and **interprets** the meaning.

- تستقبل أعضاء الحس لديك هذه المعلومات وترسلها إلى المخ.
- يفك المخ تلك الشفرات ويفسر معناها.

Activity 9 Review: Communication and Information Transfer

» Classify the following communication types into (animals, humans or both):

Communication Type	Humans	Animals	Both
1 Displaying light			✓
2 Writing			
3 Echolocation			
4 Using a cell phone			
5 Using high-pitched sounds			
6 Using echolocation			
7 Language (Speech)			
8 Traffic lights			
9 Send special scents			
10 Lighthouses			
11 Using sounds			
12 Reading			
13 Producing chatters			
14 Thumb-up or down			

Exercises on Lesson 4

1 Choose the correct answer:

1. All of the following are considered code forms, except ....
   a. facial expressions b. language
   c. sleeping d. writing

2. All of the following are information received by the eyes, except ....
   a. for someone waving b. the red traffic light
   c. lighthouses d. speaking

3. All the following depend on sound energy to communicate, except ....
   a. fire alarms b. fire signals
   c. languages d. musical instruments

4. Raising your thumb up or lowering it down is a kind of ....
   a. colors b. codes
   c. waves d. lights

5. Your .... is responsible for decoding the codes received from sense organs.
   a. thumb b. brain c. language d. nerves

6. Hikers could use all of the following to get help, except ....
   a. a rescue flare b. a mirror
   c. a fire signal d. night vision goggles

7. .... is/are a type of symbols and arranged letters that give a specific meaning.
   a. Talking b. Traffic lights
   c. Facial expressions d. Writing

8. .... depend on their sense of hearing to communicate.
   a. Humans b. Mongooses
   c. Fireflies d. a and b

9. .... is/are used to communicate via long distances.
   a. Talking b. Facial expressions
   c. Fire signals d. Language

2 Complete the following sentences from the words between the brackets:

1. .... is a code in the form of sound that humans can communicate through. (Writing - Language)
2. A .... encodes information in the form of flashes to guide sailors. (lighthouse - rescue flare)
3. The tones of musical instruments can be detected by our .... (eyes - ears)
4. Different languages are considered .... (codes - lights)

3 Put (✓) or (✗):

1. Humans use light to communicate, such as using traffic lights. (   )
2. In order for the code to be translated, the brain must identify it. (   )
3. Red and green traffic lights are codes. (   )
4. A thumbs-down code means that you are angry. (   )
5. Facial expressions are a code that can be received by the eye. (   )

4 Write the scientific term:

1. It is a pattern that has a meaning.
2. It decodes and interprets the information sent by sensory organs.
3. It's a tool used by hikers to get the attention of rescue helicopters.

5 Cross out the odd word:

1. Lighthouse - Rescue flare - Traffic lights - Fire alarm
2. Fireflies - Humpback whales - Humans - Dolphins

6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. A facial expression	a. is a way of communication by sound.
2. Lighthouse	b. is a code in the form of symbols or letters.
3. Language	c. tells others about what we feel.
4. Writing	d. is a way of communication by light.

1 .... 2 .... 3 .... 4 ....

7 Study the following figures, then answer the questions below:

The following figures represent different codes done by humans:

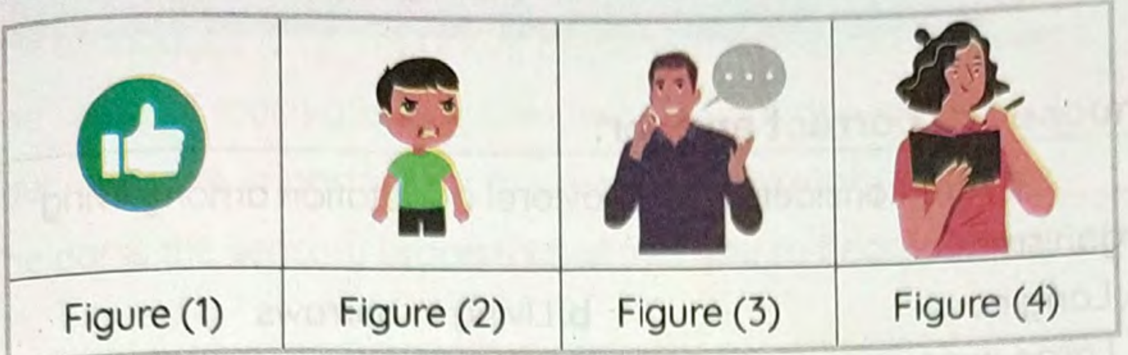


Figure (1)	Figure (2)	Figure (3)	Figure (4)

a. Figure (......) is a code that means you are angry.

b. Figure (......) is a code in the form of sound.

c. Figure (......) is a code that means you are saying "Well done".

d. Figure (......) is a code in the form of letters and symbols that have a meaning.

8 Give reasons for:

1. Hikers always carry mirrors.

....

2. The light of lighthouses is very important for sailors.

....

9 What happens if:

1. You see the red traffic light?

....

2. You see the expressions on your friend's face while you are talking?

....

Assess Your Learning

School Book Questions on Unit 1

1 Choose the correct answer:

1. .... is/are considered a behavioral adaptation among living organisms.
   a. Long ears
   b. Living in burrows
   c. Large eyes
   d. Countershading
2. .... is considered a structural adaptation among living organisms.
   a. Birds' migration
   b. Panting
   c. Brown fur
   d. Puffing the body to seem bigger in size
3. Some plants have very wide leaves to ....
   a. prevent getting torn by wind
   b. prevent animals from eating them
   c. reduce loss of water
   d. get sunlight
4. Which of the following groups reflect light falling on them well?
   a. A mirror – a wooden sheet – a metallic spoon
   b. A metallic spoon – a cardboard box – a mirror
   c. A mirror – an aluminum foil – a metallic spoon
   d. An aluminum foil – a brick – a mirror
5. The property of .... helps you to see yourself in the mirror.
   a. refraction
   b. reflection
   c. absorption
   d. density
6. On being exposed to danger, the .... system helps in identifying and avoiding it.
   a. circulatory
   b. digestive
   c. respiratory
   d. nervous

2 Compare between each of the following:

1. Inhaled air and exhaled air during occurrence of the respiration process in human.
2. Structural adaptation and behavioral adaptation in one of the living organisms.
3. Communication between humans and communication between animals.

3 Read the following sentences, then put true or false:

1. The stomach is considered an important organ in the digestive system. ( )
2. The sense of hearing allows you to see the light of a lamp. ( )
3. The esophagus is an important organ in the respiratory system. ( )
4. The sense of touch allows you to feel the heat of a stove. ( )
5. Your lungs are important organs in your respiratory system. ( )
6. The ear is the sensory organ that allows you to hear the birds' singing. ( )
7. Your heart is an important organ in the nervous system. ( )
8. The eye is the sensory organ that lets you taste the sour flavor of lemons. ( )
9. The diaphragm is an important organ in the digestive system. ( )
10. Your skin is the sensory organ that allows you to feel the smoothness of a cloth. ( )

4 Complete the following sentences by using the right words in brackets:

(touching - hearing - light - eyes - ears - heart - brain - respiratory - lung - stomach - digestive)

1. The sense of .... helps you to identify the noise.
2. The .... send(s) a signal through the nerves that reaches the ...., so you interpret that sound as a bird's singing.
3. The system that digests food to obtain energy is the .... system, and the most important organ in it is the ...., while the system that supplies the body with oxygen is the .... system.

5 Answer the following questions:

1. Why does the night vision in humans differ from that in cats?
2. Why can't bats see in the dark, but they can hunt their prey at night?

Project





» Bats are nocturnal animals. (They're active at night.)

الخفافيش كائنات ليلية؛ أي تنشط في الليل.



» Bats, like bees and butterflies, can help plants and flowers.

الخفافيش مثل النحل والفراشات تستطيع مساعدة النباتات.

Bats

الخفافيش



» Bats can fly fast like birds.

الخفافيش تستطيع الطيران بسرعة كالطيور.



» Bats locate their prey such as mosquitoes by a property called echolocation.

الخفافيش تستخدم خاصية تحديد الموقع بالصدى لمعرفة مكان الفريسة مثل البعوض.

How do bats locate things in the dark?

كيف تحدد الخفافيش موقع الأشياء في الظلام؟

Bats use a **property** known as "**echolocation**" to locate their prey and hunt in total darkness.

How bats locate things:

1. A bat produces high-pitched sound waves through air.
2. When these waves hit any object, it returns back to the bat so that it can detect the location of the prey.

تستخدم الخفافيش خاصية تحديد الموقع بصدى الصوت لتحديد مواقع الفرائس في الظلام.

يقوم الخفاش بإرسال موجات صوتية في الهواء.

عندما ترتطم الموجات بأي جسم فإنها ترتد إلى الخفاش فيستطيع تحديد موقع الفريسة.

INTERDISCIPLINARY PROJECT
THE SINAI AGAMA LIZARD



Habitat:

It lives in the dry and rocky environments of Eastern Egypt.

Food:

They feed on ants, grasshoppers, beetles, termites and other insects.

In order to survive in this harsh environment, this little reptile undergoes some structural and behavioral adaptations.

Structural adaptation:

1. It has a long, thin body to climb rocks and run quickly.
2. It has a scaly skin that traps the water in.
3. It has a tongue with a sticky surface to catch their prey.

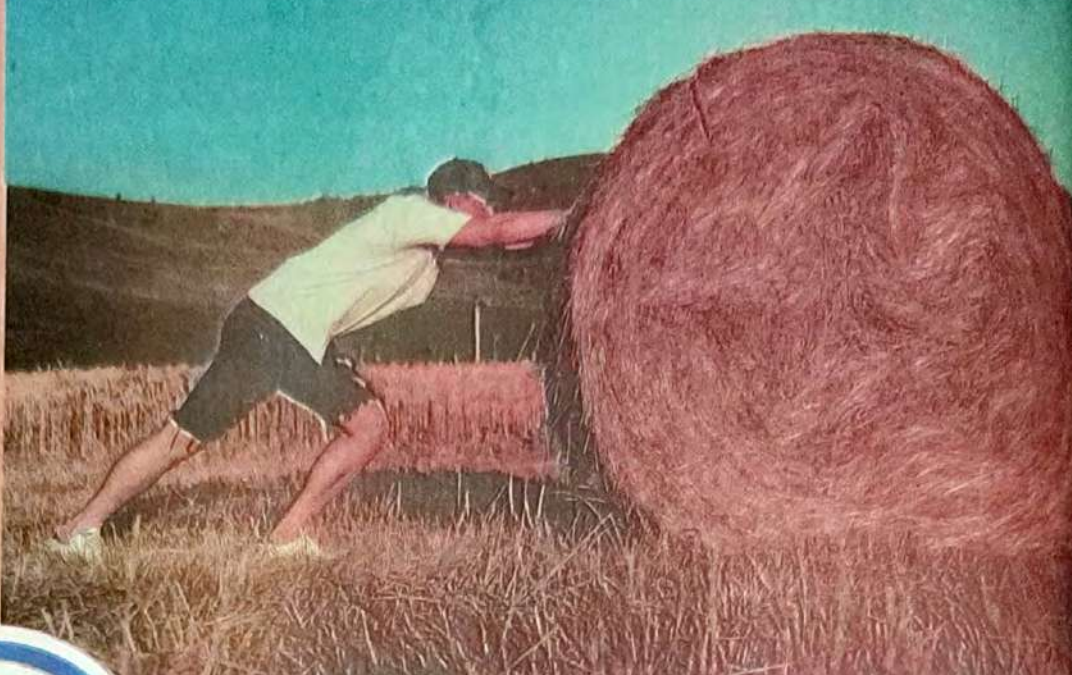
Behavioral adaptation:

1. It is active during the hottest parts of the day.
2. It likes to hang out in areas with many rocks, hard gravel, and boulders.
3. It saves its energy by hiding between rocks and it attacks its prey when it comes nearby.
4. It stands on the top parts of its toes to keep its belly high above the hot rocks.

The number of Sinai agama lizards' decreases due to some human activities, such as:

1. Changing their natural habitat to build roads and sidewalks.
2. Catching them to be sold as pets.







Unit 2 Motion

Unit Concepts:

Concept 1 Starting and Stopping

Concept 2 Energy and Motion

Concept 3 Energy and Collisions

Unit Project: Vehicle safety

Unit Objectives

In this unit, we will study:

1. The relationship between forc and object's motion.
2. Starting and stopping of objects
3. What happens when a force is applied on an object.
4. The relationship between energy and work.
5. Investigating the speed of a moving object.
6. Investigating what happens when objects collide.

Get Started
What I Already Know





» In this unit, we will study the relationship between energy and motion.

The Relationship between Energy and Motion

» Static objects moves when a proper force acts on them.
» For example, a static ball remains static until the player kicks it.

Example:

Look at this figure, the man is sitting on a wheelchair on the top of the ramp.

During moving down	The man doesn't exert force because the force of gravity pulls him down.
During moving up	The man needs to exert more force to overcome the force of gravity.



» If the ramp is not smooth, the man will need to exert more force to move.

Motion of Cars and Trains

» Objects, such as trains and cars, need a source of energy, such as fuel, to move.
» Heavy objects, such as trains, need more fuel than light objects, such as cars.

Science and Car Collision



» During collisions, we hear noise and objects get damaged.
» Modern cars are designed with a lot of safety equipment, such as seatbelts and airbags, to reduce the negative effects of collisions on the driver or the passenger.



Concept 1

Starting and Stoppin

Concept Objectives:

By the end of this concept, students will learn about:

- How force makes an object stop or move.
- Pushing force and pulling force.
- Balanced force and unbalanced force.
- Air force.
- Gravity.
- Stopping the moving objects.
  - a. Collision b. Friction force
- The relationship between force, energy and work.

Key Vocabula

- Energy
- Force
- Gravity
- Motion
- Friction
- Work

Concept 1

Starting and Stopping

Lesson 1	
Activity 1	Can you Explain?
Activity 2	Truck Verses Airplane
Activity 3	Making Things Move

Lesson 2	
Activity 4	What Do You Already Know About Starting and Stopping?
Activity 5	Objects in Motion
Activity 6	Force

Lesson 3	
Activity 7	Stopping Motion
Activity 8	Rolling Cars

Lesson 4	
Activity 9	Energy, Work, and Force
Activity 10	Record Evidence Like a Scientist: Truck Verses Airplane

Lesson 1

Unit 2

Activity 1 Can You Explain?

» An object stays static when it doesn't change its position.



Because there is no force acting on it.

• يظل الجسم ساكنًا (لا يغير موضعه) لعدم وجود قوة تؤثر عليه.

» An object moves when it changes its position.



Because there is a force acting on it.

• يتحرك الجسم (يغير موضعه) لوجود قوة مناسبة تؤثر عليه.

- Static objects require a force to move them.
- Forces could be pushing or pulling forces.
- For a static object to move, the forces acting on it need to change.

- تحتاج الأجسام الساكنة قوة لتحريكها.
- يمكن أن تكون القوة (دفع أو سحب).
- لتحريك جسم ثابت، يجب أن تتغير مقدار القوى المؤثرة عليه.

 The player needs energy to push the ball.	
 The boy needs energy to pull the bag.	

Activity 2 Truck Versus Airplane



Truck Versus Airplane



» A Jet airplane is much faster than a truck. Because the jet's engine is much more powerful than the truck's engine.

• تطير الطائرة بسرعة أكبر من الشاحنة؛ لأن محرك الطائرة أقوى بكثير من محرك الشاحنة.

Shockwave (Fastest world truck)

• It has been fitted with three jet engines.
• Its speed can reach 500 kilometers per hour.
• It is five times faster than a normal truck.

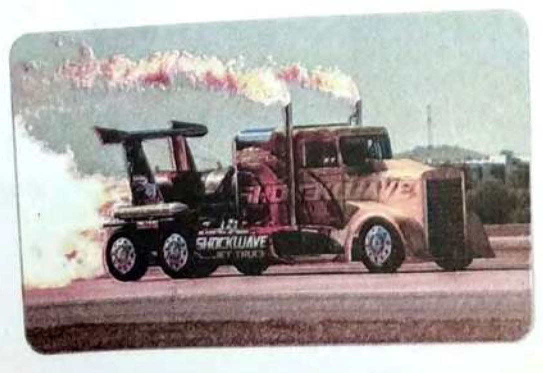
• تم تزويد تلك الشاحنة بـ ٣ محركات لطائرة نفاثة.
• تصل سرعة تلك الشاحنة لـ ٥٠٠ كم في الساعة.
• تلك الشاحنة أسرع من الشاحنة العادية بـ ٥ مرات.



How Does It Move?

» It moves and reaches record speeds by the pushing force of its powerful engines.

• تتحرك الشاحنة وتسجل سرعات قياسية بمساعدة قوة دفع المحرك.



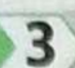
How Does It Stop?

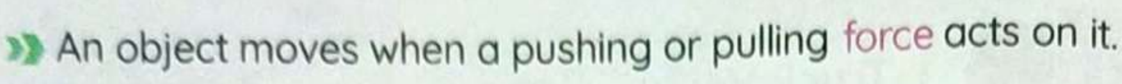
(Rocket design idea)

» Engineers installed three parachutes that help the driver to slow down the truck quickly.

• قام المهندسون بتركيب ٣ مظلات يفتحها السائق لإبطاء الشاحنة بشكل أسرع.







Activity 3 Making Things Move

Unit 2

» An object moves when a pushing or pulling force acts on it.

يتحرك الجسم عندما تؤثر عليه قوة (دفع أو سحب) مناسبة.



» An object doesn't move when no force acts on it.

لا يتحرك الجسم عندما لا تؤثر عليه قوة مناسبة.







Mention the kind of force: Push or Pull





....



Air force (Blowing wind) → It can move some objects, such as: leaves of trees.

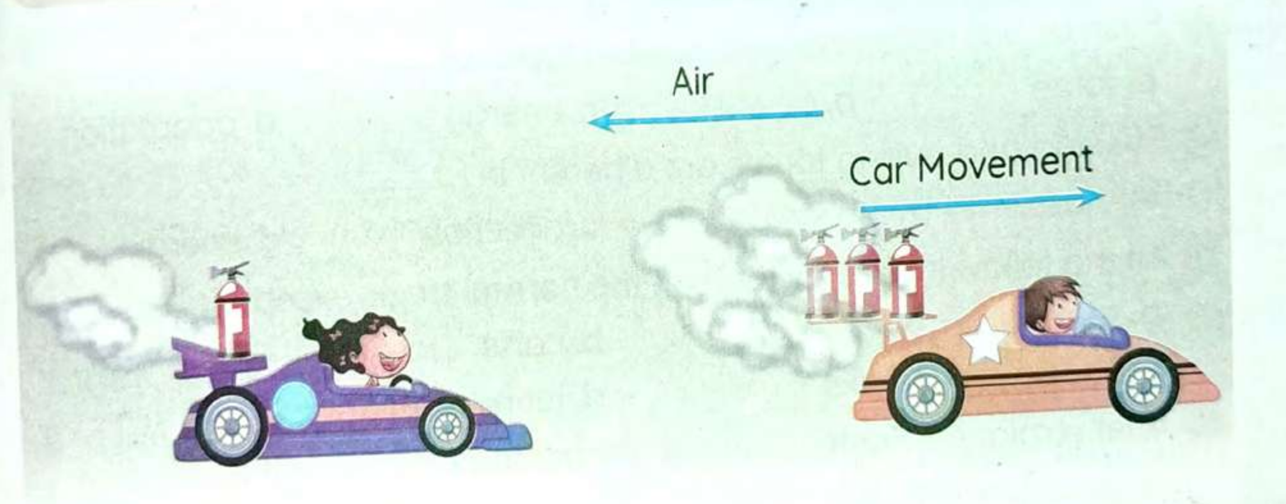


How did engineers prove that air causes movement?

كيف أثبت المهندسون أن الهواء قد يحرك الأجسام؟

- Engineers attached a fire extinguisher to a static cart.
- When air is released backward from the extinguisher, the cart begins to move forward.
- By increasing the number of fire extinguishers, the speed of the car increases and it covers a longer distance.

- قام المهندسون بتثبيت طفاية حريق على عربة ساكنة.
- عندما تنبعث الغازات من طفاية الحريق إلى الخلف تبدأ العربة في التحرك إلى الأمام.
- عند زيادة عدد طفايات الحريق تصبح السيارة أسرع وتقطع مسافة أطول.





Check your understanding?

» Put (✓) or (✗):

1. To open a closed door, we must push or pull it. ( )
2. Air is a force that can move some static objects. ( )

Exercises on Lesson 1

1 Choose the correct answer:

1. We can say that an object is in a state of motion when its ...... changes.
   a. shape b. size c. color d. position
2. A static object needs ....
   a. force to stop it b. speed to move it
   c. energy to stop it d. force to move it
3. When you move something towards you, this represents ....
   a. a pushing force b. light energy c. a pulling force d. sound energy
4. All the following represent the pushing force, except ....
   a. kicking a ball b. pressing on an electrical switch
   c. closing the desk drawer d. lifting up a bag
5. To open the door of a refrigerator, we use ...... force.
   a. friction b. gravitational c. pulling d. pushing
6. Moving a box away from you represents ...... force.
   a. magnetic b. gravitational c. pulling d. pushing
7. Push or pull actions are considered types of ....
   a. force b. devices c. energy d. adaptation
8. Pushing and pulling forces are different in ....
   a. mass b. color c. direction d. energy
9. All the following are faster than the normal truck, except ....
   a. rockets b. carts
   c. Shockwave trucks d. jet airplanes
10. A jet airplane is faster than the normal truck because the ....
    a. jet airplane is heavier than the normal truck
    b. jet airplane can fly while the normal truck can't
    c. jet airplane has more powerful engine than the truck
    d. jet airplane is bigger than the normal truck
11. The Shockwave truck has been fitted with ...... jet engines, which makes it the fastest truck in the world.
    a. two b. three c. four d. five

Concept 1

12 If the speed of a Shockwave truck is about 500 km/hr, the speed of a normal truck may equal .... km/hr.

a. 500 b. 600 c. 100 d. 450

13 All the following have engines, except the ....

a. jet airplane b. normal truck c. Shockwave truck d. bicycle

14 Wind can move some objects, such as ....

a. tree roots b. tree leaves c. jet airplanes d. rockets

15 By decreasing the number of fire extinguishers fixed on the cart, its speed ....

a. becomes zero b. remains constant

c. decreases d. increases

2 Complete the following sentences from the words between the brackets:

1 Three .... help the Shockwave truck's driver to increase its speed. (engines – parachutes)

2 A Shockwave truck records a high speed due to the jet engines' .... force. (pulling – pushing)

3 A girl needs .... to pull a bag. (fuel – force)

4 .... force is moving an object away from you. (Pushing – Pulling)

5 The engine of a jet airplane is .... powerful than that of a normal truck. (more – less)

6 Kicking the ball is a .... force. (pulling – pushing)

7 Opening a drawer is a .... force. (pulling – pushing)

8 Parachutes help the Shockwave truck slow down .... (slowly – quickly).

9 To slow down the speed of a Shockwave truck, the drivers use .... parachutes. (5 – 3)

10 Wind can move some objects, such as a .... (leaf – truck)

Unit 2

3 Put (✓) or (✗):

1. The player needs pushing force to hit the tennis ball. ( )
2. Doors can be opened only by pushing force. ( )
3. Jet airplanes are slower than rockets and faster than normal trucks. ( )
4. The Shockwave is fitted with three jet engines and three parachutes. ( )
5. Parachutes are used in Shockwave trucks and rockets. ( )
6. Parachutes help the driver to jump quickly from the Shockwave truck during landing. ( )
7. A static ball moves on the ground if it is affected by a force. ( )
8. The static object can't move until a force acts on it. ( )

4 Complete the following sentences using the words between the brackets:

(increase - static - decrease - position - rockets - jet engines - force)

1. An object stays .... until a .... acts on it to change its ....
2. There're three .... installed in the Shockwave truck to .... its speed.
3. A Shockwave truck and .... have parachutes to .... their speed.

5 Write the scientific term:

1. It's the object that doesn't change its position.
2. It's the force that the player needs to kick the ball.
3. It's the force that moves the object towards you.
4. It's the fastest truck in the world.
5. It's a tool used to decrease the speed of a Shockwave truck.

6 Cross out the odd word:

1. Push - Pull - Force - Time
2. Lift the ball - Kick the ball - Catch the ball - Throw the ball
3. Jet engine - Pulling force - Pushing force - Increasing speed
4. Parachutes - Rockets - Normal trucks - Shockwave trucks

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Shockwave trucks	a. can move the leaves of a tree.
2 Wind blowing	b. help in decreasing the speed of the Shockwave truck.
3 Parachutes	c. are slower than rockets and faster than normal trucks.
4 Jet engines	d. help to start moving the Shockwave truck.

1 .... 2 ....  3 .... 4 ....

8 Study the following figures, then complete the sentences below:

A

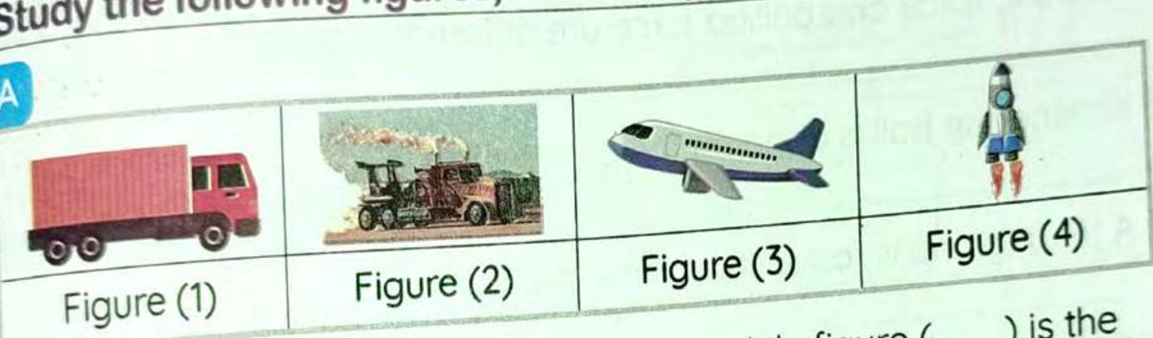
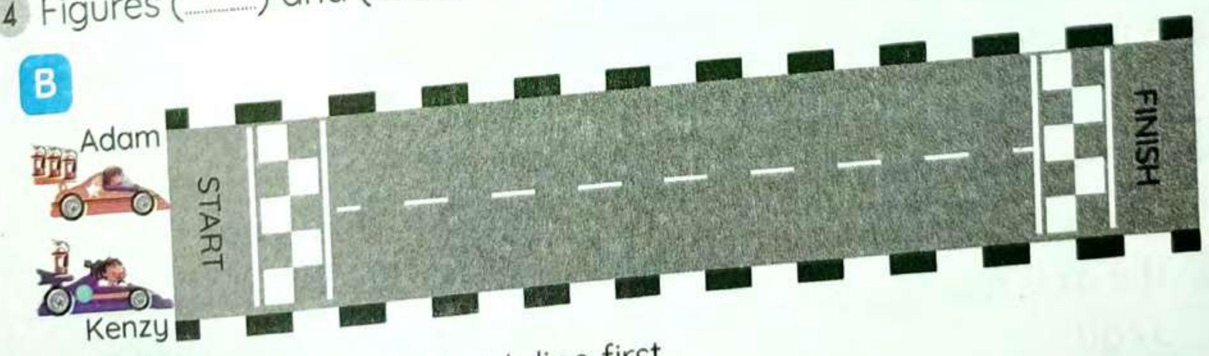


Figure (1)	Figure (2)	Figure (3)	Figure (4)

1. Figure (........) is the fastest moving object, while figure (........) is the slowest object.
2. Figure (........) represents the fastest truck in the world.
3. Parachutes are used in figures (........) and (........) to decrease their speed.
4. Figures (........) and (........) use the same kind of engine.

B



1. .... will reach the finish line first.
2. Adam will cover .... distance than Kenzy.
3. When the air is released .... from the fire extinguishers, the car moves ....

4 The two cars move due to the .... force of the ....

5 From the figure, we conclude that as we increase the number of fire extinguishers, the car becomes .... and covers .... distance.

Unit 2

9 Study the following figures, then mention the kind of force:

Figure				
(Push or Pull) Force	1	2	3	4 ....

10 Give reasons for:

1 Pushing force and pulling force are different in direction.

....

2 Kicking the ball is done by the pushing force.

....

3 A jet airplane is faster than a normal truck.

....

4 A Shockwave truck is the fastest truck in the world.

....

5 Parachutes are attached to the Shockwave truck.

....

11 What happens if:

1 A pushing or pulling force acts on a static object?

....

2 The driver of the Shockwave truck opens the parachutes?

....

3 The air is released backward from a fire extinguisher attached to a cart?

....

4 You increase the number of fire extinguishers attached to a cart?

....

Lesson 2

Activity 4 What Do You Already Know About Starting and Stopping?

1 When a force acts on a body:



Pulling Force

- Using a force to move an object towards you.

عندما تُحرك الجسم باتجاهك.

Pushing Force

- Using a force to move an object away from you.

عندما تُحرك الجسم بعيدًا عنك.

2 Balanced or unbalanced forces:

» In tug-of-war game, two teams pull the rope in opposite directions.



The rope doesn't move.



The rope moves towards the greater force.

- When the forces acting on the rope are balanced.

الحبل لا يتحرك إذا أثرت عليه قوى متزنة.

- When the forces acting on the rope are unbalanced.

الحبل يتحرك في اتجاه القوة الأكبر إذا أثرت عليه قوى غير متزنة.

» From the previous two cases, we can conclude that:

- If there are unbalanced forces acting on an object, this object will move.
- If there are balanced forces acting on an object, this object will not move.

- إذا كانت القوى المؤثرة على طرفي الحبل غير متزنة، فإن الحبل يتحرك للقوة الأكبر.
- إذا كانت القوى المؤثرة على طرفي الحبل متزنة، فإن الحبل لن يتحرك.

Activity 5 Objects in Motion

Example of the motion of an object



1. The boy holds a ball and stands beside a tree (starting position).
2. The boy throws the ball, so the pushing force of his hand moves the ball through the air.
3. The ball drops into the girl's hand by the pulling force of gravity.

Gravity • It is the force that pulls the objects downward.

4. The girl stops the ball when she catches it using the pushing force in the opposite direction.

1 يقف الولد بجانب الشجرة (موضع البداية).

2 تتحرك الكرة في الهواء بسبب قوة الدفع للولد.

3 قوة الجاذبية تسببت في سقوط الكرة بيد البنت.

قوة الجاذبية: هي القوة التي تسحب الأجسام لأسفل.

4 تقوم البنت بالتقاط الكرة وإيقافها عن طريق قوة الدفع أيضًا ولكن في اتجاه معاكس.

For any object to be in motion:

1. A pushing or pulling force must act on it.
2. A change in position happens as time passes.

1 ليتحرك أي جسم لا بد أن يؤثر على الجسم قوة دفع أو سحب.

2 لا بد أن يحدث تغير لموضع الجسم مع مرور زمن معين.

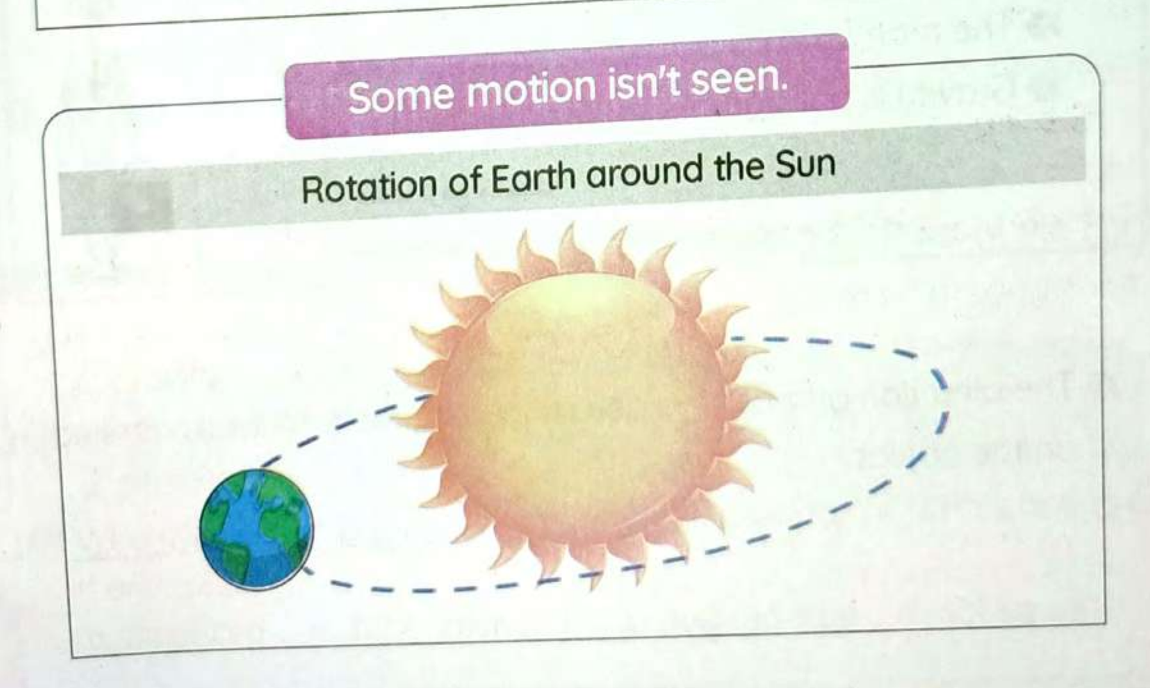
Motion It is the change in an object's position relative to a fixed point. هو تغير موضع الجسم مع مرور زمن بالنسبة لنقطة ثابتة.

Some motion is easy to see.

A person walking	A leaf falling	A thrown ball

Some motion isn't seen.

Rotation of Earth around the Sun



Activity 6 Force

- The world around us is in a constant motion.
- Some things move quickly, while others move slowly.
- All motion, fast or slow, is caused by force. Force is a push or pull.

Force ● It is a **push** or **pull** that is applied to an object to change its position.

هو دفع أو سحب جسم مما يؤدي لتغيير موضعه.

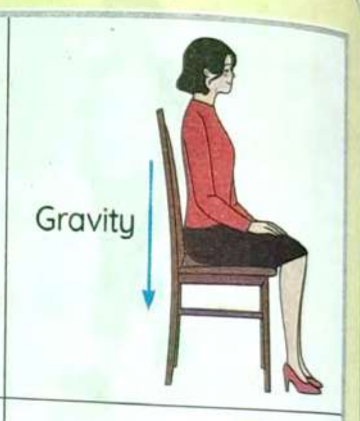
Examples:



Sitting on a chair:

- Gravity is pulling the girl downward and holding the girl on the chair.

• **عند الجلوس على الكرسي:**
قوة الجاذبية تجذب البنت لأسفل وتعمل على ثباتها على الكرسي.





Holding a bag:

- The man's arm is pulling the bag upward.
- Gravity is pulling the bag downward.

• **عندما ترفع حقيبتك:**
قوة الجاذبية تجذب الحقيبة لأسفل بينما ترفعها ذراعك للأعلى.



- The direction of motion is determined by the total force applied on the object.

• يتحدد اتجاه الحركة بمقدار القوى المحصلة المؤثرة على الجسم.

Exercises on Lesson 2

1 Choose the correct answer:

1. Pushing and pulling forces can be used to ....
   a. move objects b. stop objects
   c. change the object speed d. all the previous answers
2. Objects need a force to move, this force is represented in ....
   a. pushing only b. pulling only
   c. pushing and pulling together d. the Earth gravity only
3. All of the following are examples of pulling forces, except ....
   a. kicking a ball b. pulling the rope
   c. opening the desk drawer d. lifting up your bag
4. You can see the movement of all the following objects, except the movement of ....
   a. a flying airplane b. a running horse
   c. sea waves d. the planet Earth
5. In the tug-of-war game, the two teams ....
   a. push the rope in the same direction
   b. pull the rope in opposite directions
   c. push the rope in opposite directions
   d. pull the rope in the same direction
6. A ball thrown in the air is affected by the .... force of your hand and the .... force of gravity.
   a. pull - push b. pull - pull c. push - pull d. push - push
7. The force that pulls the objects down towards the center of the Earth is ....
   a. gravity b. pushing c. friction d. wind
8. When a body moves forward, its .... changes.
   a. position b. size c. color d. shape
9. When a ball stands on the ground without moving, the forces acting on it are ....
   a. balanced b. unbalanced c. pushing it up d. not equal

Unit 2

10 In the opposite figure, the body is under the effect of ....

Smaller Force → [box] ← Greater Force

a. balanced forces and moving to the right
b. balanced forces and moving to the left
c. unbalanced forces and moving to the right
d. unbalanced forces and moving to the left

11 The bag in this figure is affected by the ....

a. pulling force upward only
b. pushing force upward only
c. pulling force downward only
d. pulling force upward and downward

2 Complete the following sentences from the words between the brackets:

1 The .... forces cause the object to move. (balanced – unbalanced)

2 The force that pulls things down is .... (friction – gravity)

3 When playing the tug-of-war game, if each team pulls the rope with equal force, the forces are .... (balanced – unbalanced)

4 The gravity is a .... force. (pushing – pulling)

5 To move a wheelbarrow, you need to .... it. (pull – push)

6 In the tug-of-war game, the rope moves towards the .... force. (smaller – greater)

7 A .... force is applied when a goalkeeper catches the ball. (pushing – pulling)

8 A bus starts to move due to the .... force of the engine. (pushing – pulling)

9 By increasing the force acting on an object, it covers a .... distance. (shorter – longer)

10 A moving train is affected by a/an .... force. (balanced – unbalanced)

Concept 1

3 Put (✓) or (✗):

1. Gravitational force is an upward pulling force. ( )
2. When a pen falls down from your hand, the acting force is the gravity force. ( )
3. When the static body is affected by balanced forces, the body moves. ( )
4. The seesaw moves up and down because the forces that act on it are unbalanced. ( )
5. When the position of the body changes from a fixed point, we can say that the body moves. ( )
6. Gravity pulls objects towards the center of the Earth. ( )
7. An object needs force to move, while it doesn't need any force to stop. ( )
8. In the tug-of-war game, the two teams push the ball in opposite directions. ( )
9. Some motion can't be seen by the eyes, such as a leaf falling off a tree. ( )

4 Complete the following sentences using the words between the brackets:

(downward - pushed - forward - fixed - pulls - backward - position)

1. On fixing a fire extinguisher to a cart, the cart moves .... when the air moves backward.
2. The gravity .... objects .... to the Earth's surface.
3. A bike needs to be .... to move.
4. Motion is the change in an object's .... relative to a .... point.

5 Write the scientific term:

1. It's the change of the position of an object relative to a fixed point.
2. It's the force that pulls objects towards the Earth's center.
3. It's the force done to move the object away from you.
4. It's the force done to move the object towards you.
5. A game in which two teams pull the rope in opposite directions.

Unit 2

6 Cross out the odd word:

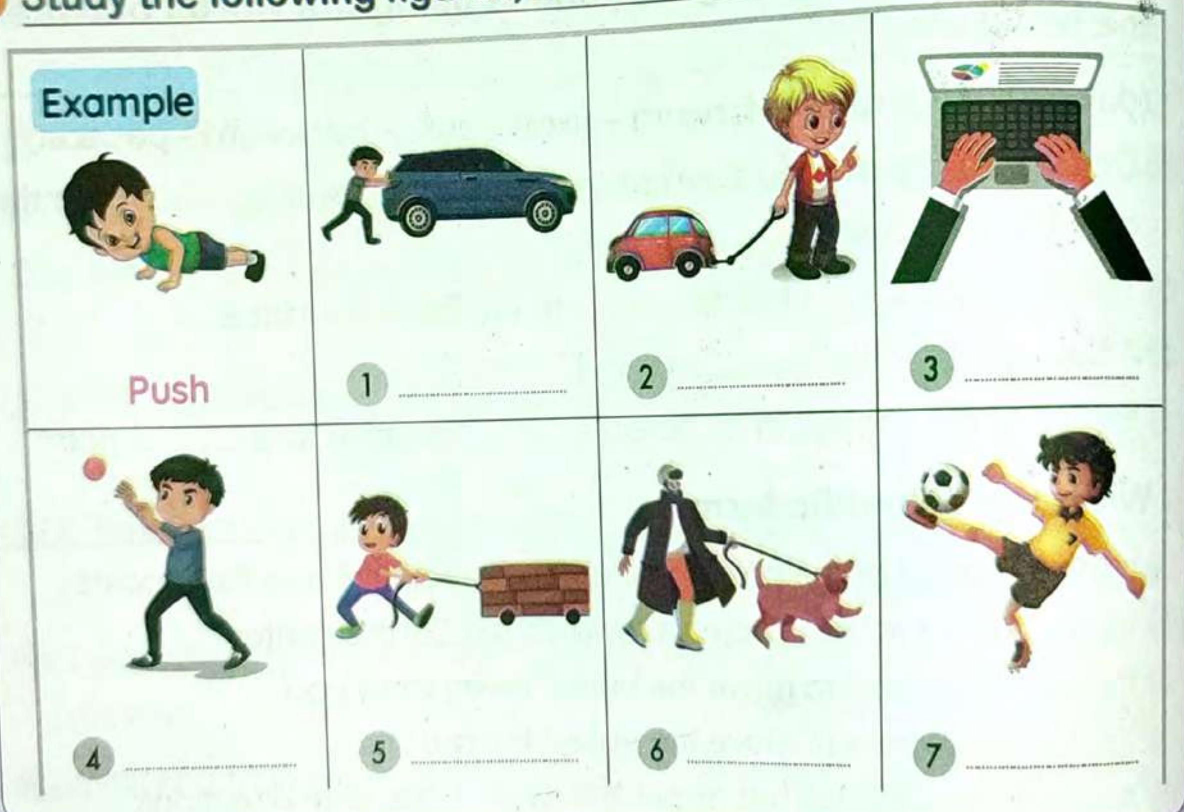
1. Push force - Pull force - Gravity - Downward
2. A person walking - Earth motion - A leaf falling - A thrown ball
3. Tug-of-war - Opposite directions - Push force - Pull force
4. A static object moves - Balanced force - Unbalanced force
5. A walking boy - A running horse - A sleeping cat - A flying kite

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Motion	a. is the force that attracts the objects toward Earth's surface.
2 Gravity	b. means that an object moves away from you.
3 Pull force	c. is the change of an object's position relative to a fixed point.
4 Push force	d. means that an object moves towards you.

1 .... 2 .... 3 .... 4 ....

8 Study the following figures, then classify them as (push or pull):





8 ....
9 ....
10 ....
11 ....
12 ....
13 ....
14 ....
15 ....

9 Study the following figures, then choose the correct answer:

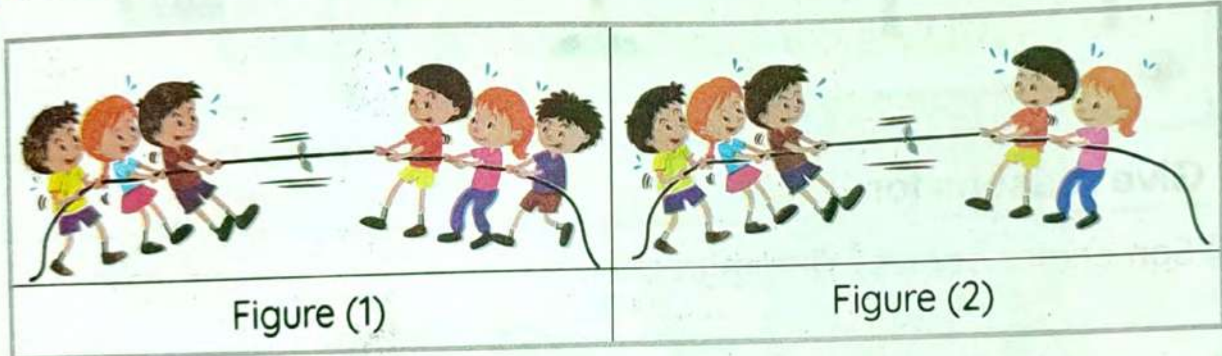


Figure (1)	Figure (2)

1. Figure (1) represents .... forces. (balanced - unbalanced)
2. Figure (2) represents .... forces. (balanced - unbalanced)
3. The rope will move in .... (figure (1) - figure (2))
4. The two teams are .... (pulling - pushing) the rope in .... (the same - opposite) direction(s).

Unit 2

10 Study the following figure, then complete:

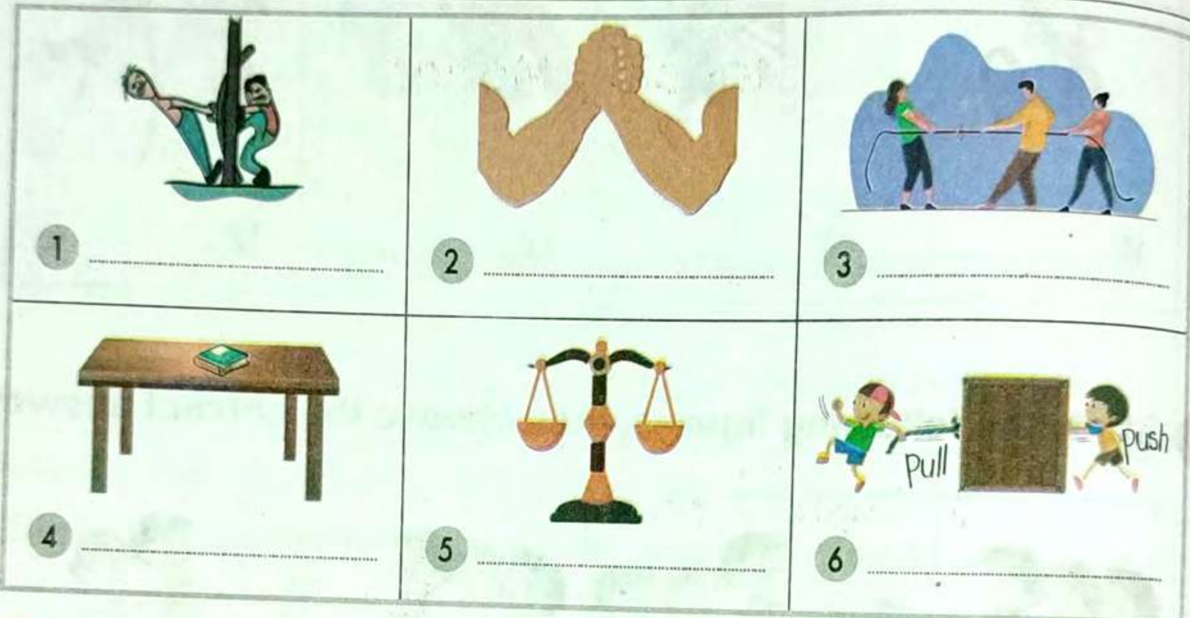
- The opposite figure represents an apple falling from a tree and a boy catching it.



a. The apple falling down is considered a .... force.

b. Catching the apple is considered a .... force.

11 Study the following figures, then classify them as balanced or unbalanced forces:



1 ....
2 ....
3 ....
4 ....
5 ....
6 ....

12 Give reasons for:

1 Sometimes apples fall from trees.

....

2 Sometimes the rope moves in the tug-of-war game.

....

3 Sometimes the rope doesn't move in the tug-of-war game.

....

13 What happens if:

1 A static object is affected by balanced forces?

....

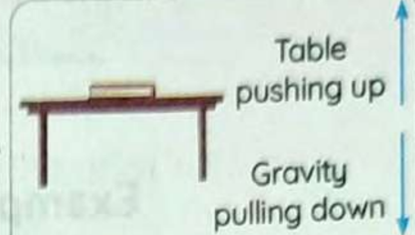
2 A static object is affected by unbalanced forces?

....

Lesson 3

Activity 7 Stopping Motion

» A static book on a table is affected by balanced forces:



1. It is pulled down by the force of gravity.
2. It is pushed up by the force the table exerts.

Stopping Motion

» A moving object only stops when:

A force of the **same amount** is applied to it in the **opposite direction** from which it is moving.

- تتوقف الأجسام عن الحركة عندما تكون القوى المؤثرة على الجسم متساوية في المقدار ومضادة في الاتجاه.

Example: A car crashes into a wall.



- The car will stop because the wall applied a force to the car with the **same amount** and in the **opposite direction**.
- تتوقف السيارة عن الحركة عند اصطدامها بالجدار، حيث يؤثر الحائط على السيارة بقوة مساوية لقوة السيارة وفي اتجاه معاكس.

Friction Force

- Friction always slows down or stops moving objects.
- Friction acts in the opposite direction of the motion.

• تعمل قوة الاحتكاك على إبطاء الجسم أو إيقافه. • تؤثر قوة الاحتكاك في عكس اتجاه قوة الجسم.

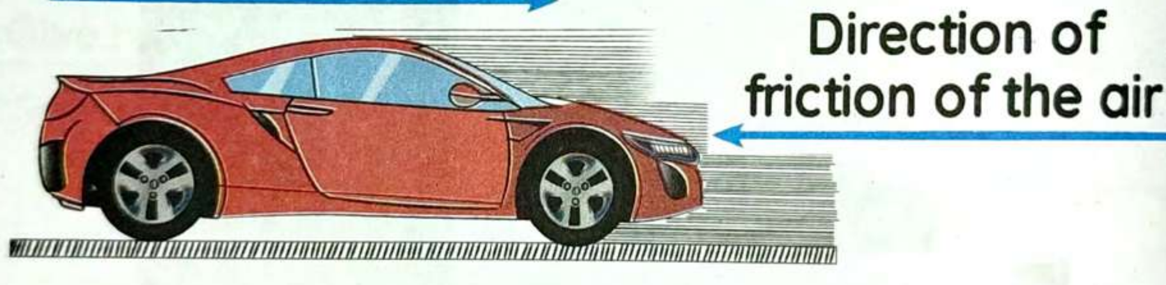
Example: A car runs out of gas.

- The car will slow down until it stops due to:

1. The friction between the ground and the car's tires.
2. The air that rubs against the car.

• تبطئ السيارة سرعتها حتى تتوقف نتيجة لـ:

1. قوة الاحتكاك بين إطارات السيارة والطريق.
2. قوة احتكاك الهواء بسطح السيارة.



Friction

It is a force that is exerted when objects rub against each other.

هي القوة التي تظهر بين سطحَي جسمين متلامسين.

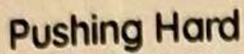
Activity 8 Rolling Cars

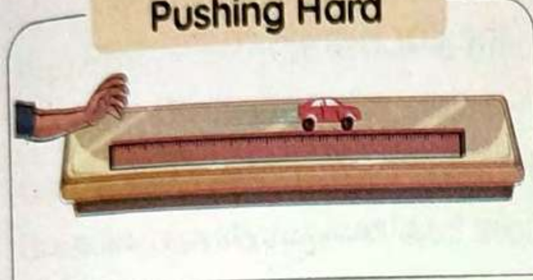
Activity

The Effect of Force on a Static Object

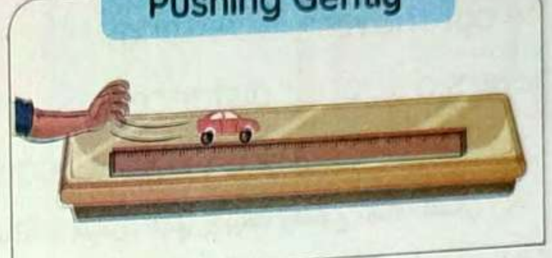
Tools: 1 Toy car 2 Measuring ruler

Steps:





Pushing Gently



1. Push the toy car **hard** from the starting point, **then** record the distance covered by the car using the measuring ruler.
2. **Repeat the previous step** several times and record this data in a table, then calculate the average distance.
3. Push the toy car **gently** from the starting point, **then** record the distance covered by the car using the measuring ruler.
4. **Repeat the previous step** several times and record this data in a table, then calculate the average distance.

Results:

Table (A): When the toy car is pushed hard:

Trial	1	2	3	4
Distance	11	14	15	16

Average distance = $\frac{11 + 14 + 15 + 16}{4} = \frac{56}{4}$ = 14 cm.

Table (B): When the toy car is pushed gently:

Trial	1	2	3	4
Distance	8	10	12	14

$$\text{Average distance} = \frac{8 + 10 + 12 + 14}{4} = \frac{44}{4} = 11 \text{ cm.}$$

Observations:

- When we push the car hard, the car moves faster and covers a longer distance.
- عند دفع السيارة بقوة:
  تتحرك السيارة بسرعة وتقطع مسافة أطول.

- When we push the car gently, the car moves slower and covers a shorter distance.
- عند دفع السيارة برفق:
  تتحرك السيارة ببطء وتقطع مسافة أقصر.

Conclusions:

By increasing the acting force on a body:

- It moves for a longer distance.
- Its speed increases, and its kinetic energy increases.
- كلما زادت القوة المؤثرة على الجسم يتحرك الجسم مسافة أكبر، وتزداد سرعة الجسم وطاقة حركته.

By applying the same force on different objects:

- The small car moves for a long distance.
- The big truck moves for a short distance.
- عندما تؤثر نفس القوة على أجسام مختلفة:
  السيارة تسير لمسافة كبيرة – الشاحنة تسير لمسافة صغيرة.





Exercises on Lesson 3

1 Choose the correct answer:

1. The force that occurs when an object rubs against another object is called .... force.
   a. friction b. gravity c. push d. pull
2. Friction force decreases the .... of a moving object.
   a. mass b. speed c. volume d. a and b
3. The book in this figure is affected by the ....
   a. pushing force downward only
   b. pulling force downward only
   c. pulling force downward and the pushing force upward
   d. pulling force upward and the pushing force downward
4. A moving body stops when .... force in .... direction is applied to it.
   a. the same – the same b. the same – the opposite
   c. a greater – the same d. a smaller - the opposite
5. For a static object, all the following equal zero, except the ....
   a. force b. speed c. mass d. friction
6. Friction force always acts in .... direction to the moving force.
   a. the same b. the opposite c. a parallel d. a perpendicular
7. The car will move upward the slope when: ....
   a. Moving force < Friction force
   b. Moving force = Friction force
   c. Moving force > Friction force
8. Which car covers the longest distance?
   a. A small car pushed gently b. A big truck pushed hard
   c. A small car pushed hard d. A big truck pushed gently
9. By decreasing the force acting on a body, its kinetic energy ....
   a. increases b. decreases
   c. remains constant d. becomes zero

10 The distance covered by an object depends on all the following, except the ....

a. force acting on it
b. mass of the object
c. color of the object
d. friction force affecting it

11 By increasing the pushing force on an object, all of the following increase, except the object's ....

a. speed
b. distance
c. kinetic energy
d. mass

12 The gravity always pulls objects ....

a. upward
b. downward
c. forward
d. backward

13 On acting with the same force on different toys, the toy whose mass is .... covers the shortest distance.

a. 200 grams
b. 100 grams
c. 70 grams
d. 250 grams

14 If the object moves forward, friction force affects the body in the .... direction.

a. upward
b. downward
c. same
d. opposite

15 A big truck covers a distance .... the small car if the same force is applied on them.

a. shorter than
b. equal to
c. longer than
d. similar to

2 Complete the following sentences from the words between the brackets:

1 The car slows down its speed when it runs out of fuel as a result of ....
(gravity – friction)

2 Friction force .... the speed of a moving object.
(decreases – increases)

3 A car stops on crashing into a wall due to being affected by .... forces.
(balanced – unbalanced)

4 When air resists the motion of a car, it is a type of .... force.
(gravitational – friction)

5 On throwing a ball up in the air, it will .... (hang up in air – fall down)

6 When a car crashes into a wall, it will .... (stay moving – stop)

7 Without friction force, a moving object will ....
(stop – remain in motion)

8. On rubbing our hands, we feel warm due to .... force. (magnetic - friction)
9. A heavy object requires a .... force to move. (smaller - greater)
10. By increasing the kinetic energy of an object, it travels a .... distance. (shorter - longer)
11. On throwing a ball in the air, it is affected by the .... force of your hand. (pushing - pulling)

3 Put (✓) or (✗):

1. The force that slows down or decreases the speed of an object is gravity. ( )
2. For a moving car, there's a friction force between its tires and the road only. ( )
3. Friction force speeds up a moving object. ( )
4. Air resists the motion of a car. ( )
5. The book on the table is static because it is affected by balanced forces. ( )
6. The ball on the ground is affected by the pulling force of gravity. ( )
7. The direction of force is determined by the total force applied on the object. ( )
8. The moving body stops when the same force in the same direction is applied to it. ( )
9. A static object remains as it is until a balanced force acts on it. ( )
10. Friction force always acts in the opposite direction to the moving force. ( )
11. On pushing two similar toys with the same force, they cover different distances. ( )
12. Objects travel for a short distance when they are pushed gently. ( )
13. Kinetic energy decreases by increasing the object speed. ( )
14. As the object becomes faster, it covers a long distance. ( )
15. A big truck covers a longer distance than a small car if they are pushed with the same force. ( )

Unit 2

4 Complete the following sentences using the words between the brackets:

A (increases - friction - becomes zero - balanced - opposite - decreases - Unbalanced)

1. A car stops on crashing into a wall due to being affected by .... forces in .... directions.
2. .... forces cause the change of an object's position.
3. When a moving car runs out of fuel, its speed .... gradually due to .... force.
4. When a force is exerted on a moving car at the same direction of its motion, the car's speed ....

B (slower - bigger mass - faster - longer - more - less - shorter)

1. When a boy kicks a ball hard, it moves .... and covers a .... distance.
2. When a boy kicks a ball gently, it moves .... and covers a .... distance.
3. A truck needs .... force than a small car to be stopped, as it has ....

5 Write the scientific term:

1. It's the force that pulls objects towards the center of the Earth.
2. It's the force that opposes the movement between touching surfaces.
3. It's a push or pull that is applied on an object to move it.

6 Cross out the odd word:

- Friction - Gravity - Pull - Sound

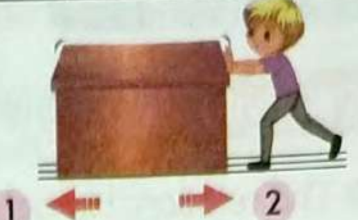
7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Balanced forces	a. causes the objects to fall downward.
2. Unbalanced forces	b. don't cause any change to the object state.
3. Friction force	c. make a static object move.
4. Gravity	d. slows and stops the moving object.

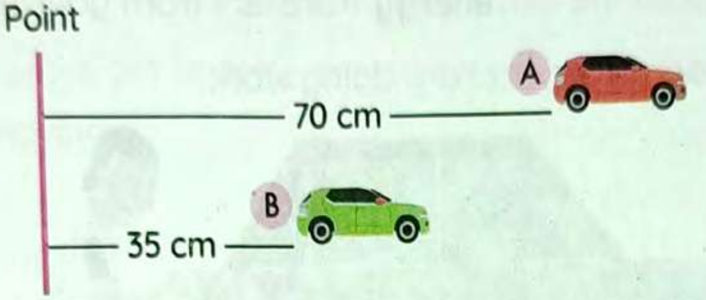
1 .... 2 .... 3 .... 4 ....

8 Study the following figure, then complete:

- Label the following two forces:
  - a. Force (1): ....
  - b. Force (2): ....



9 Look at the following figure, then answer:



- Which of these toy cars is affected by greater force? (Give a reason for your answer.)

....

10 Look at the following figure, then answer:

- On rolling a tennis ball and a basketball on a court with the same force, which one covers a longer distance? And why?



....

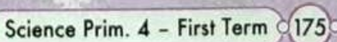
....

11 Give reasons for:

1. Friction force stops a moving object.
2. When the girl stops pedaling, the bike stops after a short time.
3. When a moving car crashes into a wall, it stops moving.
4. When you push the toy car gently, it moves for a short distance.

12 What happens if:

1. A girl on a bike stops pedaling?
2. A moving car crashes into a wall?
3. You push a toy car gently (concerning its distance)?
4. You push a toy car hard (concerning its kinetic energy)?





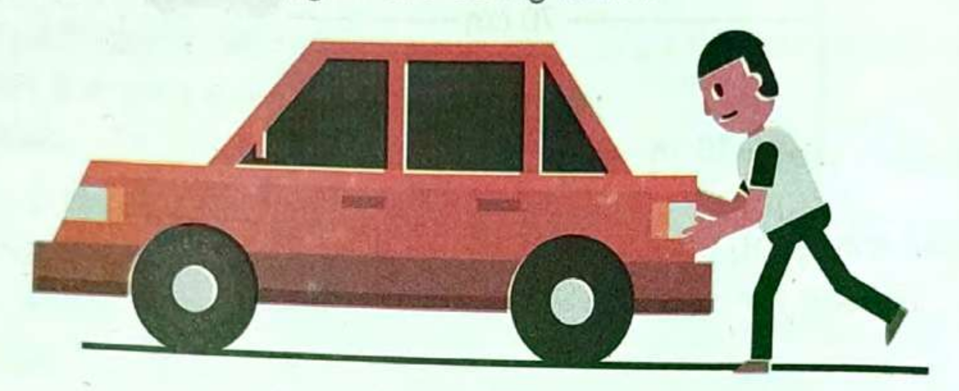
Lesson 4

Unit 2

Activity 9 Energy, Work, and Force

» The relationship between energy, work, and force:

- To push a car along a flat road, this needs a lot of **force**.
- When you push the car, **energy** transfers from your body to the car.
- When the car moves, you are doing **work**.



.لكي تدفع سيارة على طريق مستوٍ، يتطلب تحريك السيارة قدرًا كبيرًا من القوة
.عندما تدفع السيارة تنتقل الطاقة من جسمك إلى السيارة
.عندما تتحرك السيارة، فأنت تقوم بشغل

- Force and energy are different, but they are **related** to each other.
- **Force** transfers **energy** from one object to another.
- **Force** is something that changes **energy** so that it can do **work**.
- **Work** is the energy transferred by a force to move the object.

• القوة والطاقة مختلفتان، لكنهما مرتبطتان ببعضهما البعض.
• القوة تنقل الطاقة من جسم إلى آخر.
• القوة هي المؤثر الذي يغير الطاقة للتمكن من بذل الشغل.
• الشغل هو مقدار الطاقة اللازمة لتحريك جسم من خلال القوة المؤثرة فيه.

Force → transfers → Energy → enables us to do → Work

Activity 10 Record Evidence Like a Scientist: Truck Versus Airplane

» Now that you have learned about the role of balanced and unbalanced forces in starting and stopping, review Truck Versus Airplane again. You first saw this in Wonder.

Question:

» How do forces act on different objects to make them start moving or stop moving?

My Claim:

____

____

____

Evidence:

____

____

____

Scientific Explanation with Reasoning:

____

____

____

____

____

____

____

Exercises on Lesson 4

1 Choose the correct answer:

1. The goal keeper can catch the ball by applying a .... force on the ball.
   a. pulling b. pushing
   c. friction d. lifting
2. The girl gets the .... needed to study hard from eating food.
   a. force b. work c. energy d. speed
3. Work is done when we ....
   a. read b. sleep c. push a wall d. kick a ball
4. To move a static object, this requires a proper .... to act on it.
   a. force b. work c. energy d. speed
5. When the man pushes the car, kinetic energy ....
   a. changes to potential energy
   b. becomes zero
   c. transfers from the man to the car
   d. transfers from the car to the man

2 Complete the following sentences from the words between the brackets:

1. To exert a force on an object, a/an .... is needed. (work - energy)
2. .... transfers energy from an object to another. (Speed - Force)
3. When a static ball ...., there's no work done. (moves - doesn't move)
4. Lifting up a bowling ball requires .... energy than a football. (more - less)
5. To stop or start moving an object, a .... is required. (sound - force)
6. .... is done when a force moves an object. (Energy - Work)
7. When work is done, there's .... of energy. (transfer - no transfer)

Put (✓) or (✗):

1. You are doing work while sitting on a chair. ( )
2. Energy is required to do work. ( )
3. When the player hit the ball with the hockey bat, we say that he does work. ( )
4. Kicking the ball hard needs a strong pulling force. ( )
5. If the boy applies a great force to move a box, but the box doesn't move, we can say that the boy consumed energy but he didn't do any work. ( )
6. When you push a table, energy transfers from the table to your body. ( )

Write the scientific term:

1. It's the effect that affects an object and changes its state.
2. It is the energy needed to move an object by applying a force on it.

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Friction	a. It's the ability to do work.
2. Motion	b. It's the force that pulls things downwards.
3. Energy	c. It's the change in the position of the object.
4. Gravity	d. It's a force that arises between the surfaces of two contacted bodies.

1 .... 2 .... 3 .... 4 ....

Give reasons for:

1. The boy who pushes the car does work.

....

2. The boy who pushes the wall doesn't do any work.

....



Concept 2

Energy and Motion

Concept Objectives:

By the end of this concept, students will learn about:

- Roller coasters.
- Basics of energy.
- Properties of energy.
- Types of energy.
- Kinetic energy and potential energy.

Key Vocabulary:

- Kinetic Energy
- Potential energy
- Thermal energy
- Chemical energy

Concept 2

Energy and Motion

Lesson 1

Unit 2

Activity 1 Can You Explain?



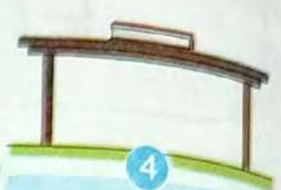
1 A sand surfer



2 A ball on the ground



3 A ball moving in the air



4 A book on the table

- In figure 1, a sand surfer moves fast down the ramp.
- In figure 2, the ball on the ground has no energy.
- In figure 3, the ball moves in the air and has kinetic energy.
- In figure 4, the book on the table stores potential energy.

- في الشكل 1، يتحرك الشخص الذي يتزلج على الرمال بسرعة كبيرة لأسفل المنحدر.
- في الشكل 2، الكرة على الأرض ليس لديها طاقة.
- في الشكل 3، تتحرك الكرة في الهواء ولها طاقة حركية.
- في الشكل 4، الكتاب الموجود على الطاولة مخزن بداخله طاقة وضع.

From the previous explanation, we conclude that:

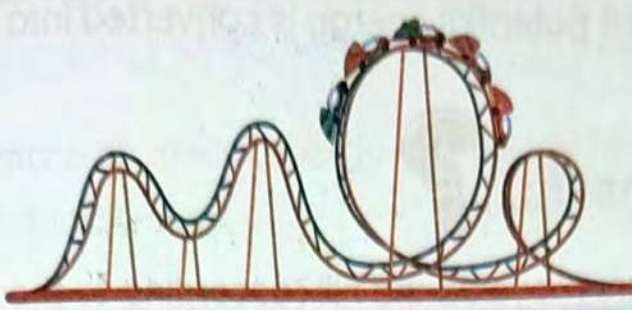
- Static objects have no kinetic energy.
- When static objects start to move, they get kinetic energy.
- When an object moves up a hill, it stores potential energy.
- When an object moves down a hill, its potential energy changes into kinetic energy.

من الشرح السابق نستنتج أن:

- الأجسام الساكنة ليس لها طاقة حركية.
- عندما تبدأ الأجسام الساكنة في الحركة، فإنها تكتسب طاقة حركية.
- عندما يتحرك الجسم لأعلى التل، فإنه يخزن بداخله طاقة وضع.
- عندما يتحرك الجسم أسفل التل، تتغير طاقة الوضع إلى طاقة حركية.

Activity 2 Roller Coaster

Roller Coaster قطار الملاهي السريع





At the beginning,
electricity and motors carry the cars up to the top of the hill.

تعمل الكهرباء والمحركات على حمل عربات القطار لأعلى المنحدر.

1 During moving upward - أثناء الصعود لأعلى



- The stored potential energy increases gradually.

• تزداد طاقة الوضع المخزنة داخل القطار تدريجيًا.

2 At the highest point (on the hill) - عند أعلى المنحدر



- The stored potential energy becomes maximum.

• تصبح طاقة الوضع المخزنة أكبر ما يمكن.

3 During sliding down - أثناء الانزلاق



- The stored potential energy is converted gradually into kinetic energy.
  As we move down, the speed increases and the kinetic energy increases.

• تتحول الطاقة المختزنة لطاقة حركية تدريجيًا.

كلما اقتربنا من الأرض، تزيد سرعة الجسم وطاقة حركته.

Give a reason for...



- Roller coaster cars don't need electricity during sliding down.

Because the stored potential energy is converted into kinetic energy.

What happens if...



1. Roller coaster cars move up the hill (according to the energy)?

The stored potential energy increases.

2. Roller coaster cars move downhill (according to the energy)?

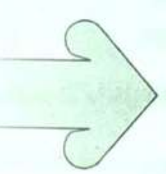
The stored potential energy is converted into kinetic energy.

3. Roller coaster cars stop on the hill (according to the energy)?

The kinetic energy becomes zero.

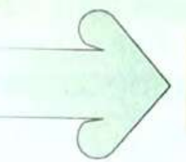
The stored potential energy becomes maximum.

As the height increases (While moving up)



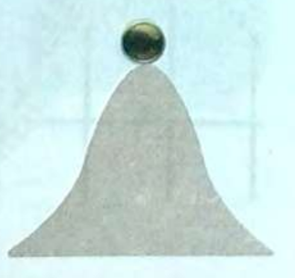
Potential energy increases

As the speed increases (While moving down)

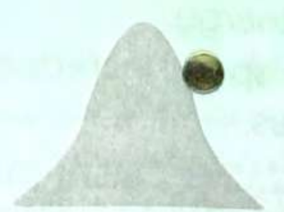


Kinetic energy increases

- A static object on a hill stores **potential** energy.



- When the object moves, it gains **kinetic** energy.

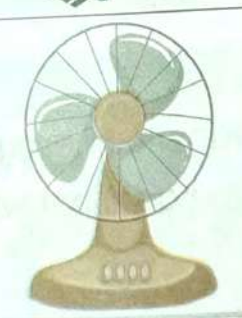


- A static object on the ground has **no** energy.



Activity 3 What Do You Already Know About Energy and Motion?

Importance of Energy in Our Life

1 Our bodies store chemical energy that we get from the food we eat.	
2 Thermal energy helps us in cooking food.	
3 Light energy helps us in lighting houses and streets.	
4 Electrical energy helps us in operating electric devices.	

- تخزن أجسامنا الطاقة الكيميائية التي نحصل عليها من الغذاء.
- الطاقة الحرارية تساعدنا في طهي الطعام.
- الطاقة الضوئية تساعدنا في إنارة المنازل والشوارع.
- الطاقة الكهربية تساعدنا على تشغيل الأجهزة الكهربية.

» Put (✓) or (✗):

A bar of chocolate has no energy. ( )

Moving Energy

Example: When a football player kicks the ball:

1. The ball on the ground has **no** energy.

الكرة على الأرض ليس لديها طاقة.



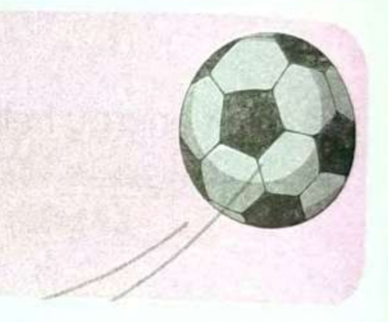
2. Kinetic energy transfers from the **player's foot** to the **ball**, so the ball moves.

تنتقل طاقة الحركة من قدم اللاعب إلى الكرة فتتحرك الكرة.



3. The ball moves in the air because it gains **kinetic energy.**

تتحرك الكرة في الهواء نتيجة انتقال طاقة الحركة إليها.



4. Kinetic energy transfers from the **ball** to the **goal net** which vibrates.

تنتقل الطاقة من الكرة للشباك التي تهتز.



» **Energy** affects objects and makes them move or change their places.

• **الطاقة** هو ما يؤثر في الأجسام المختلفة ويجعلها تتحرك أو تغير من موضعها.

Energy ● It is the ability to do work or to make a change.

• **الطاقة** هي القدرة على بذل شغل أو إحداث تغيير.

Exercises on Lesson 1

1 Choose the correct answer:

1. When an object moves down a ramp, its stored potential energy ....
   a. increases b. doesn't change
   c. changes to a less active form of energy
   d. changes to a more active form of energy
2. The energy gained by a ball when it falls from above is .... energy.
   a. potential b. kinetic c. light d. chemical
3. A static ball on the .... has no energy.
   a. ramp b. table c. ground d. chair
4. .... help(s) the cars of roller coasters to move up the ramp.
   a. Electricity b. Motors c. Generators d. a and b
5. At the highest point on the ramp, the stored energy of the object ....
   a. increases b. decreases
   c. becomes zero d. becomes maximum
6. The roller coaster cars don't need electricity when ....
   a. moving up b. sliding down
   c. starting motion d. a and b
7. As a roller coaster moves up or down, which of the following remains constant?
   a. The object's speed b. Kinetic energy
   c. Potential energy d. The object's mass
8. In the opposite figure, the .... equals zero.
   a. book's mass b. book's height
   c. book's speed d. book's energy
9. All of these objects have energy, except for ....
   a. a truck moving on a flat road b. a static toy car on a table
   c. a basketball moving in the air d. a static ball on the ground
10. As the object's .... increases, its kinetic energy increases.
    a. height b. speed c. potential energy d. temperature
11. Humans need the .... energy stored in food to do all daily activities.
    a. kinetic b. chemical c. thermal d. potential

Unit 2

12 When a moving ball hits the goal net, it vibrates because the .... energy of the ball is transferred to it.

a. sound b. light c. thermal d. kinetic

2 Complete the following sentences from the words between the brackets:

1. On the top of a ramp, ... energy is maximum. (potential – kinetic)
2. On the top of a ramp, ... energy is zero. (potential – kinetic)
3. A book on the second shelf in a cupboard stores .... energy than a book on the third shelf. (more – less)
4. The roller coaster moves .... when sliding down a ramp. (faster – slower)
5. .... helps the roller coaster move down the ramp. (An electric motor – Potential energy)
6. The .... energy of an object moving horizontally doesn't change. (potential – kinetic)
7. On kicking a ball, ... energy transfers from your foot to the ball. (potential – kinetic)
8. When a person pushes a car forward, his body begins to sweat heavily because his body .... his stored energy. (increases - consumes)

3 Put (✓) or (✗):

1. The apple on the tree has no energy, while it gains energy when falling down. ( )
2. The speed of a roller coaster increases as it moves down the ramp. ( )
3. A static object at the top of the ramp has no kinetic energy. ( )
4. A roller coaster doesn't need electricity when moving down the ramp. ( )
5. When the roller coaster slides down fast, its kinetic energy increases. ( )
6. The moving objects have energy, while the objects that don't move have no energy. ( )
7. As the height of an object from the Earth's surface increases, its potential energy decreases. ( )

8. When you kick a ball, kinetic energy is produced. ( )
9. A static ball moves on the ground if it is affected by a force. ( )
10. We eat food to gain energy. ( )

4 Complete the following sentences using the words between the brackets:

(motor - height - potential energy - electrical energy - kinetic energy - speed)

1. By increasing an object's ...., its kinetic energy increases, while by increasing the .... from the ground, potential energy increases.
2. When a roller coaster moves down a ramp, the cars don't need .... as .... is converted into ....
3. A .... can change electrical energy into kinetic energy.

5 Write the scientific term:

1. It's the energy stored in the object at the top of the ramp.
2. It's the energy gained by an object due to its motion.
3. It's a form of energy that increases when the speed of an object increases.
4. It's the energy that helps the static cars of a roller coaster to move up.
5. It's the energy stored in the food we eat.

6 Cross out the odd word:

1. Potential energy - Object's height - Object's speed
2. Kinetic energy - Object's height - Object's speed

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. While moving up,	a. has no energy.
2. While sliding down,	b. an object has the most potential energy.
3. At the top of the ramp,	c. a static object has the most kinetic energy.
4. A static object on the ground,	d. potential energy changes into kinetic energy gradually.
	e. kinetic energy changes into potential energy gradually.

1 .... 2 .... 3 .... 4 ....

8 Study the following figure, then complete:

1. .... energy increases when the roller coaster moves from (A) to (B).
2. .... energy increases when the roller coaster moves from (B) to (A).
3. The roller coaster at point (.......) has the highest potential energy.
4. .... and .... help the roller coaster to move from (B) to (A).

(A)
(B)

9 Give reasons for:

1. While moving upward, the stored potential energy increases.
   ....
2. While moving down the ramp, the kinetic energy increases.
   ....
3. Electricity is very important to operate a roller coaster.
   ....

10 What happens if:

1. Roller coaster cars move up the ramp?
   ....
2. Roller coaster cars slide down the ramp?
   ....
3. Roller coasters reach the top of the ramp?
   ....
4. Roller coasters stop at the ground?
   ....

Lesson 2

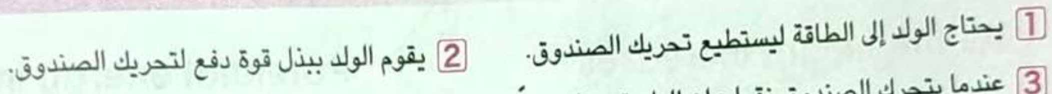
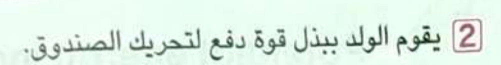
Concept 2

Activity 4 Energy Basics

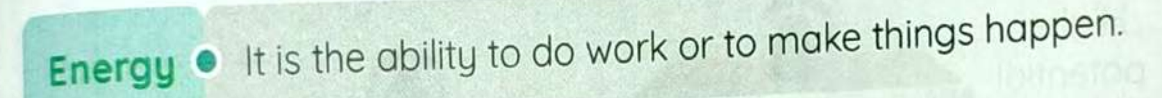
The Relationship between Energy, Force and Work

Example: When the boy pushes the box,

1. The boy needs **energy** to move the box.
2. The boy exerts pushing **force** on the box.
3. When the box moves, **work** is done.

1 يحتاج الولد إلى الطاقة ليستطيع تحريك الصندوق.
2 يقوم الولد ببذل قوة دفع لتحريك الصندوق.
3 عندما يتحرك الصندوق نقول: إن الولد قد بذل شغلاً.



Energy • It is the ability to do work or to make things happen.

Work • It is the force that causes an object to move.

Properties of Energy

1. Energy can be **stored** and **changed (transformed)** from one form to another.
   Example • Roller coaster

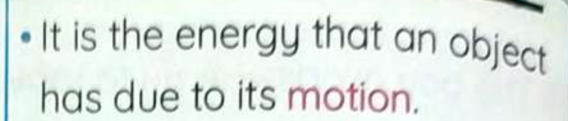
2. Most forms of energy can't be seen.
   Examples • Heat energy • Sound energy • Chemical energy • Electrical energy

3. The work done by energy can be seen and measured.
   Example • The goal net vibrates because kinetic energy transfers from the ball to it.

Activity 5 Kinetic and Potential Energy



Scientists classify energy into two types:



Potential Energy

- It is the energy stored in an object due to its position.
- هي الطاقة المختزنة داخل الجسم بسبب موضعه.

Example:

When you raise the ball.

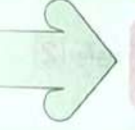
Kinetic Energy

- It is the energy that an object has due to its motion.
- هي الطاقة التي يمتلكها الجسم بسبب حركته.

Example:

When you leave the ball to fall.

As the height increases → **Potential energy increases**



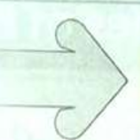


Higher potential energy



Lower potential energy

As the speed increases → **Kinetic energy increases**





Lower speed = lower kinetic energy

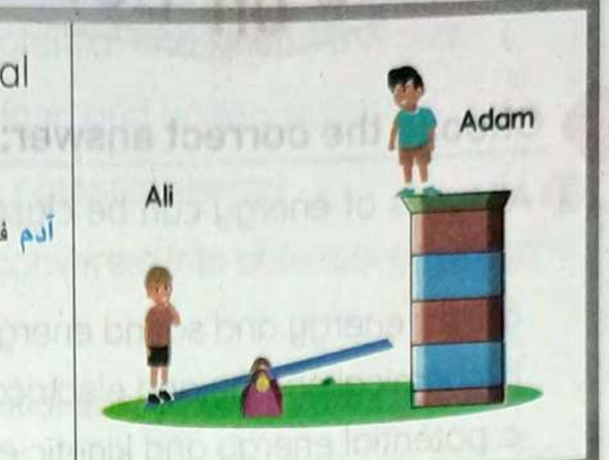
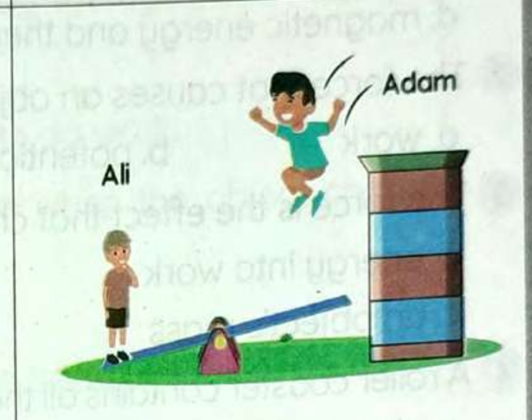
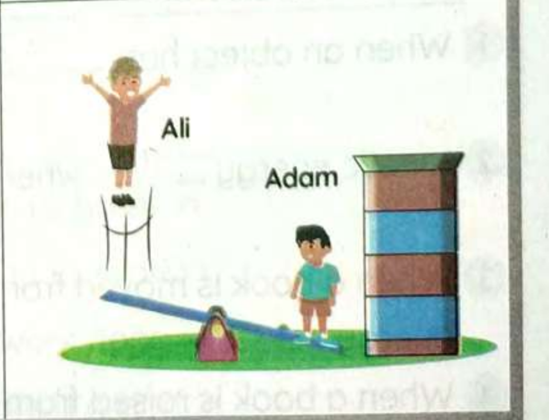


Higher speed = higher kinetic energy

- Potential energy means that an object is ready to do work or to be active.
- An object gains kinetic energy when it starts moving.

• طاقة الوضع تعني أن جسمًا ما جاهز لبذل شغل. • يكتسب الجسم طاقة حركة عندما يبدأ الحركة.

Example: Potential energy changes to kinetic energy:

Adam on the tower has high potential energy. آدم فوق البرج لديه طاقة وضع كبيرة.	
When Adam jumps down, his potential energy is converted into kinetic energy. عندما يقفز آدم لأسفل تتحول طاقة الوضع إلى طاقة حركة.	
Kinetic energy is transferred to Ali, which pushes him up in the air. تنتقل الطاقة الحركية من آدم إلى علي لتدفعه لأعلى في الهواء.	
During Ali's movement in the air, kinetic energy is converted gradually into potential energy. أثناء ارتفاع علي لأعلى تتحول طاقة الحركة إلى طاقة وضع تدريجيًا.	

Exercises on Lesson 2

1 Choose the correct answer:

1. All types of energy can be classified into two main groups, which are ....
   a. light energy and sound energy
   b. chemical energy and electrical energy
   c. potential energy and kinetic energy
   d. magnetic energy and thermal energy

2. The force that causes an object to move a distance is called ....
   a. work b. potential c. gravity d. pull force

3. The force is the effect that changes ....
   a. energy into work b. work into energy
   c. an object's mass d. an object's temperature

4. A roller coaster contains all the following energies, except .... energy.
   a. electrical b. potential c. chemical d. kinetic

5. Kinetic energy is the energy gained by an object due to its ....
   a. position b. shape c. motion d. size

6. When an acrobat player jumps down, his .... increases.
   a. speed b. height
   c. mass d. potential energy

2 Complete the following sentences from the words between the brackets:

1. When an object has .... energy, it is ready to be more active. (potential – kinetic)
2. Kinetic energy .... when an object stops moving. (increases – becomes zero)
3. When a book is moved from a higher to a lower shelf, its potential energy .... (decreases – increases)
4. When a book is raised from the ground to a table, it stores .... energy. (kinetic – potential)

3 Put (✓) or (✗):

1. All energies can be classified into potential and kinetic energies. ( )
2. Thermal energy is used in cooking food and boiling water. ( )
3. A static object moves when it gains potential energy. ( )
4. In a roller coaster, kinetic energy is converted into potential energy and vice versa. ( )
5. As an object moves faster, its potential energy increases. ( )
6. Some forms of energy can be seen by the eyes, such as light and electrical energies. ( )
7. Force gives us energy that enables us to do work. ( )
8. We can measure what energy can do when the object changes its position. ( )

4 Complete the following sentences using the words between the brackets:

(decreases - potential - Light - kinetic - increases)

1. When an apple moves down from a tree, ... energy changes into .... energy.
2. If you throw a ball upward, its kinetic energy ...., and its potential energy ....
3. .... energy is a form of energy that transfers through the air in a form of waves.

5 Write the scientific term:

1. It's the energy stored in an object due to its position.
2. It's the energy that an object gains due to its motion.
3. It's the effect that changes energy into work done.
4. It is a force that causes an object to move a distance.

6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Food	a. can be transformed into potential energy.
2 Kinetic energy	b. is a source of energy for humans.
3 Potential energy	c. is the stored energy in an object.
	d. cannot transform into another form of energy.

1 .... 2 .... 3 ....

7 Cross out the odd word:

- Thermal energy - Chemical energy - Sound energy - Light energy

8 Study the following figures, then complete:

Figure (1)	Figure (2)	Figure (3)

1. In figure (2), ... energy is converted gradually into .... energy.
2. In figure (1), the ball has .... energy only.
3. In figure (3), the ball has .... energy.

9 Give reasons for:

1. A static book on a table has energy.
2. When the apple falls from the tree, its kinetic energy increases.
3. The ball moves when you kick it.

10 What happens if:

1. A basketball is thrown up (concerning the potential energy)?
2. A book falls from a table (concerning the potential energy)?
3. You kick a ball (concerning the kinetic energy)?
4. A book is placed on a higher shelf (concerning the potential energy)?

Concept 2

Lesson 3

Activity 6 Forms of Kinetic and Potential Energy

» All forms of energy can be classified into potential or kinetic energies.

• كل صور الطاقة يمكن تصنيفها إلى طاقة وضع أو طاقة حركة.

1 Forms of kinetic energy:

1 Sound energy



• Movement of sound waves in the air

• انتقال موجات الصوت في الهواء

2 Light energy



• Movement of light waves in the air

• انتقال موجات الضوء في الهواء

3 Electrical energy



• Movement of electricity in the wires

• الكهرباء تسري داخل الأسلاك

4 Heat energy



• Vibration of water particles during boiling

• اهتزاز جزيئات المياه عند غليانها

Kinetic energy depends on:

1 The speed of the body.

2 The mass of the body.

• تعتمد طاقة الحركة على سرعة الجسم وكتلته.

2 Forms of potential energy:

1 Gravitational potential energy



- A ball at the top of a hill stores gravitational potential energy.

• الكرة أعلى التل تخزن بداخلها طاقة وضع الجاذبية.

2 Chemical potential energy

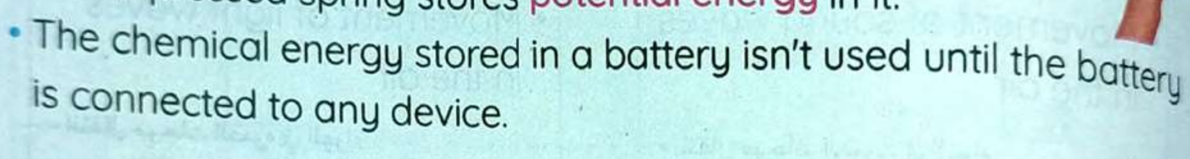


- A battery stores chemical potential energy.

• البطارية تخزن بداخلها طاقة وضع كيميائية.



Notes:



- A compressed spring stores potential energy in it.
- The chemical energy stored in a battery isn't used until the battery is connected to any device.

• الزنبرك يخزن بداخله طاقة وضع.

• لا تُستخدم الطاقة الكيميائية المُخزنة داخل البطارية إلا عند توصيل البطارية بأحد الأجهزة.

Potential energy depends on:

1. The height of the body.
2. The mass of the body.

• تعتمد طاقة الوضع على ارتفاع الجسم وكتلته.

Check your understanding?



» Which ball has more potential energy?

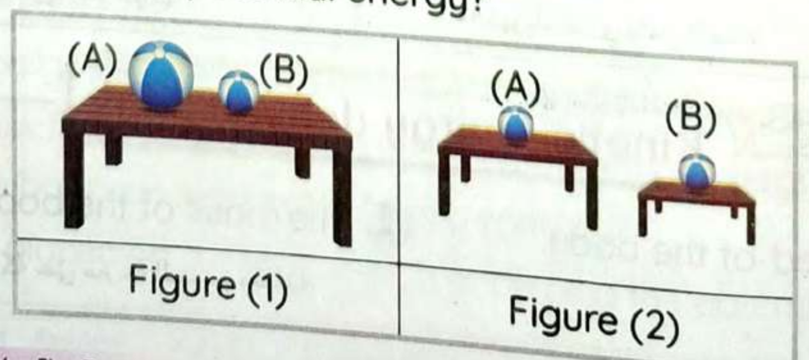


Figure (1)	Figure (2)

Activity 7 Types of Energy

- Energy is found everywhere around us.
- All forms of energy are classified into potential or kinetic energy.

Energy can be

1. Changed (transformed) from one form to another.
2. Transferred from an object to another.

Energy Transformations

Tool	Figure	Energy Used	Energy Produced
1 Flashlight (Torch)		Chemical energy (Stored in a battery)	Light energy Thermal energy
2 Gas oven		Chemical energy (Stored in natural gas)	Thermal energy
3 Spring toy car		Potential energy	Kinetic energy
4 Real Car		Chemical energy (Stored in gasoline)	Kinetic energy Thermal energy Sound energy

Check your understanding?



Tool	Energy Used	Energy Produced
1 Electric lamp	....	....
2 Radio	....	....
3 TV	....	....
4 Electric fan	....	....
5 Hand bell	....	....
6 Electric bell	....	....
7 Roller coaster	....	....
8 Washing machine	....	....

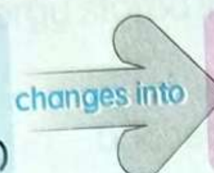


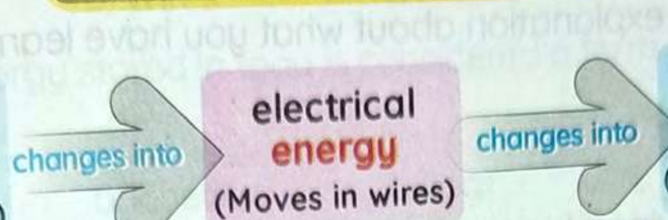
Lesson 4

Concept 2

Activity 8 Easy Life Tool

Robot (With Batteries)





Chemical energy (Stored in a battery) → changes into → electrical energy (Moves in wires) → changes into → kinetic energy (Makes the robot move)

» Robots were invented to make tasks easier:

For example:

1. The robot is powered by batteries.
2. Chemical energy stored in batteries is converted into electrical energy.
3. Electerical energy is converted into kinetic energy when the robot's hand move to open the bottle.

1 يستمد الروبوت طاقته من البطاريات.
2 تتحول الطاقة الكيميائية المختزنة في البطارية إلى طاقة كهربية.
3 تتحول الطاقة الكهربية إلى طاقة حركية في يد الروبوت لفتح غطاء الزجاجة.



Energy is neither created nor destroyed, but it can be converted from one form to another.

الطاقة لا تفنى أو تستحدث من العدم، ولكن يمكن تحويلها من صورة لأخرى.

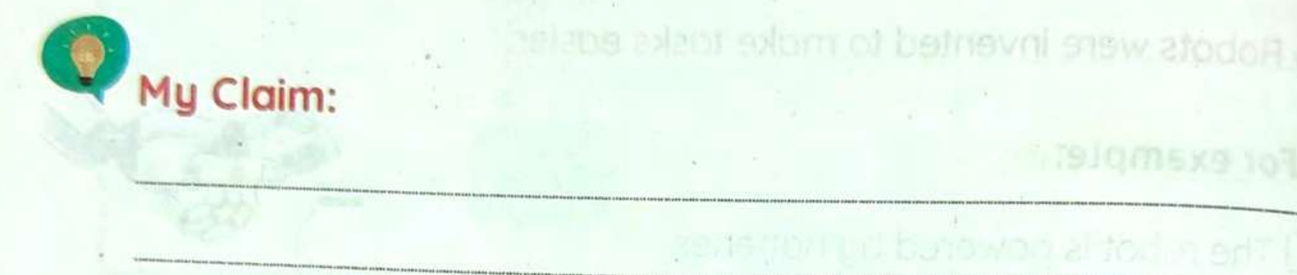
Activity 9 Record Evidence Like a Scientist: Roller Coaster

- Now that you have learned more about energy, motion, potential energy, kinetic energy and the different energy transformations.
- Try to think like a scientist by writing your claim, your evidence and your scientific explanation about what you have learned.

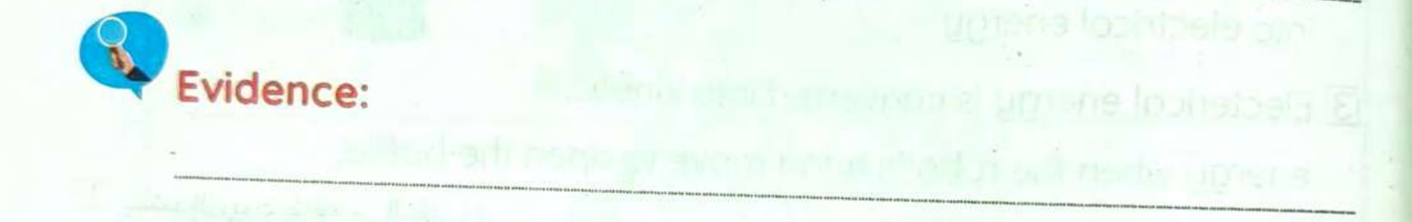
Question:

- How do moving objects get energy?

My Claim:



Evidence:



Scientific Explanation with Reasoning:

Exercises on Lessons 3 and 4

1 Choose the correct answer:

1. Which of the following can store energy?
   a. Batteries b. Wires c. Plastic d. Rubber
2. Chemical energy stored in food is considered a form of .... energy.
   a. potential b. kinetic c. heat d. light
3. The potential energy of an object depends on ....
   a. its mass only b. its height from the Earth's surface only
   c. its mass and its height from the Earth's surface
   d. its temperature
4. Chemical energy can be stored in ....
   a. food only b. batteries only
   c. televisions and food d. food and batteries
5. All the following release sound energy, except the ....
   a. door bell b. radio c. flashlight d. loudspeakers
6. A toy car stores .... energy at the top of ramp.
   a. kinetic b. chemical c. thermal d. potential
7. .... energy is stored in the compressed spring.
   a. Kinetic b. Chemical c. Potential d. Thermal
8. Any device operated by batteries stores .... potential energy in it.
   a. gravitational b. chemical c. sound d. thermal
9. An object's .... affect(s) both kinetic and potential energies.
   a. speed b. mass c. height d. a and b
10. In a ...., chemical energy is converted into light energy.
    a. gas oven b. clock c. flashlight d. normal car
11. The vibration of water particles when boiling water is considered ....
    a. thermal potential energy b. chemical kinetic energy
    c. chemical potential energy d. thermal kinetic energy

12. The source of energy in a robot is ....
    a. electrical energy
    b. solar energy
    c. thermal energy
    d. chemical energy

13. What is the correct arrangement for the energy transformation in a robot?
    a. Chemical energy → kinetic energy → electrical energy
    b. Kinetic energy → chemical energy → electrical energy
    c. Chemical energy → electrical energy → kinetic energy
    d. kinetic energy → kinetic energy → chemical energy

2 Complete the following sentences from the words between the brackets:

1. The gas oven converts .... energy into heat energy to cook the food. (chemical - electrical)
2. What kind of energy is stored inside the battery? (Chemical energy - Heat energy)
3. A/An .... changes electrical energy into kinetic and sound energies. (electric lamp – washing machine)
4. When two different books exist at the same height, they store .... amount(s) of potential energy. (different – the same)
5. When you clap your hands, kinetic energy is converted into .... energy. (light – sound)
6. In a television, ... energy is converted into light and sound energies. (chemical – electrical)
7. In an ...., electrical energy is converted into light and thermal energies. (electric fan – electric lamp)

3 Put (✓) or (✗):

1. In an electric fan, kinetic energy is converted into electrical energy. ( )
2. The chemical energy in a battery can be converted into electrical energy. ( )

3. An apple on the ground stores chemical potential energy. ( )
4. Falling objects have both kinetic and potential energies. ( )
5. A static object on the ramp has potential energy only. ( )
6. As an object's height increases, its kinetic energy increases. ( )
7. When an object slides down a ramp, its potential energy decreases. ( )
8. The movement of electricity in wires is considered a form of kinetic energy. ( )
9. All forms of energy can be classified into two types. ( )
10. Energy is neither destroyed nor created from nothing. ( )
11. Energy can't be transferred from one object to another. ( )

4 Correct the underlined words:

1. A fan turns the chemical energy stored in natural gas into thermal energy.
2. When an apple falls from a tree, it gains potential energy.
3. Chemical energy and light energy transfer in the air in the form of waves.
4. A compressed spring stores chemical energy.

5 Complete the following sentences using the words between the brackets:

(decreases - potential - gravitational - kinetic - chemical - speed - increases)

1. The energy which is stored in a ball at the top of a hill is .... potential energy.
2. When an object moves down, its kinetic energy .... as its .... increases
3. When a boy moves down a slide, ... energy is converted into .... energy.

6 Write the scientific term:

1. It's the energy stored in the object due to its position.
2. It's the energy an object gains due to its motion.
3. It's the energy stored in a compressed spring.
4. It's a form of kinetic energy that transfers through wires.
5. It's a form of kinetic energy that can be seen by the eyes.
6. It's a form of kinetic energy that can be heard by the ears.
7. It's a form of potential energy that pulls the object towards Earth's center.
8. It's the produced energy from a battery.
9. It's a device that changes electrical energy into sound energy.

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. An object's mass	a. is a factor that affects the object's potential energy only.
2. An object's speed	b. is a factor that affects the object's potential and kinetic energies.
3. An object's height	c. doesn't affect either the potential or the kinetic energies of an object.
4. An object's color	d. When it increases, the object's kinetic energy increases.

1 .... 2 .... 3 .... 4 ....

8 Cross out the odd word:

1. Vegetables – Normal car – Electric heater – Gas oven
2. Electric lamp – TV – Radio – Flashlight

9 Complete the following tables:

1

Tool	Electric bell	Hand bell
Energy Used		
Energy Produced		



2

Tool	Normal car	A car operated by a remote	A spring-powered car
Energy Used			
Energy Produced			

10 Study the following figures, then classify them as (kinetic or potential) energies:

1	2	3	4	5	6 ....

Unit 2

11 Complete the following diagram:

a. .... energy (Stored in the batteries of a robot) → changes into → b. .... energy (Moves in wires) → changes into → c. .... energy (Makes the robot move)

12 Give reasons for:

1. Electrical energy is considered a form of kinetic energy.

   ....

   ....

2. A TV produces different kinds of energy.

   ....

   ....

3. You feel warm when you rub your hands together.

   ....

   ....

13 What happens if:

1. You operate an electric lamp?

   ....

   ....

2. You operate an electric fan?

   ....

   ....

3. You turn on a flashlight?

   ....

   ....



Concept 3

Energy and Collisions

Concept Objectives:

By the end of this concept, students will learn about:

- Collision.
- Examples of collision:
  a. Wrecking ball b. Cricket
- Safety equipment during collision
  a. Seatbelt b. Airbag
- Basics of speed.
- How to measure an object's speed.
- Comparing the speed of different objects.
- The relationship between speed and kinetic energy.
- The effect of mass, speed or force on collision.
- Sliding on an inclined ramp.
- Energy conservation in Newton's cradle.

Key Vocabulary:

- Collision
- Speed
- Mass

Concept 3

Energy and Collisions

Lesson 1	
Activity 1	Can you Explain?
Activity 2	Collision
Activity 3	Watching Objects Collide

Lesson 2	
Activity 4	Basics of Speed
Activity 5	Racing Downhill

Lesson 3	
Activity 6	Energy and Collision
Activity 7	The Effect of Speed on Collision

Lesson 4	
Activity 8	Speed and Collision
Activity 9	The Effect of Mass on Collision
Activity 10	Energy Conservation During Collision

Lesson 1





Activity 1 Can You Explain?

What happens to objects when they collide?



- A fast-moving object has more energy than a slow-moving object.
- A heavy object has more energy than a light object.
- An object with more energy will cause more damage than an object with less energy.

Example of collision:

Wrecking Ball

- It is a very heavy steel ball that swings on a cable.
- It is used by construction workers to knock down walls or parts of buildings.

كرة الهدم:

- هي كرة فولاذية ثقيلة معلقة بكابل.
- تساعد عمال البناء على تكسير الحوائط أو أجزاء من المباني.



Activity 2 Collision

Collision in Cricket



- Cricket is a popular game all over the world.
- The player holds a wooden bat to hit the ball.
- **When the player hits the ball:**
  - Kinetic energy transfers from the bat to the ball.
  - The speed of the ball increases.
  - The ball returns in a different direction.
  - Collision always makes a popping sound.

- لعبة الكريكيت هي لعبة معروفة حول العالم.
- يُمسك اللاعب بمضرب خشبي لضرب الكرة.
- **عندما يضرب اللاعب الكرة:**
  - سوف تنتقل الطاقة الحركية من المضرب إلى الكرة.
  - تزداد سرعة الكرة وتعود الكرة في اتجاه مختلف.
  - ينتج عن الاصطدام دائمًا صوت.

Check your understanding?



Study the following figure, then put (✓) or (✗):

1. Energy transfers from the ball to the player's foot. (   )
2. The ball gains potential energy. (   )
3. The direction of the ball changes. (   )
4. The speed of the ball decreases. (   )



A player kicks the ball.

Activity 3 Watching Objects Collide

» What happens when a car stops suddenly?

- The driver's body continues to move forward. Because moving objects stay in motion until something stops them.





• ماذا يحدث عندما تتوقف السيارة فجأة؟

– يستمر جسم السائق في التحرك للأمام.

– حيث تظل الأجسام المتحركة في حالة حركة حتى يوقفها شيء ما.

Safety Equipment During Collision
معدات السلامة أثناء التصادم

1 Seatbelt حزام الأمان

- It's used in cars to keep the driver and the passengers from moving forward during a collision (when the car stops suddenly).

• يُستخدم لمنع جسم السائق والركاب من التحرك للأمام وقت التصادم.







Seatbelts have saved thousands of lives.

Unit 2

2 Airbag الوسادة الهوائية

Material ▸ • It is made of a thin nylon material.

Location ▸ • It is folded into the steering wheel, dashboard, seats or doors.

. تُصنع الوسادة الهوائية من النايلون الخفيف.
. تُطوى داخل عجلة القيادة أو لوحة التابلوه أو المقاعد أو الأبواب.

Idea

a During collision:

• The airbag inflates automatically. G.R
Because the sensors of the car detect a crash.

b After collision:

• The airbag deflates as fast as it inflates. G.R
Because it has holes and vents that allow the gas to come out of the airbag, so the driver can get out of the car.

. تنتفخ الوسادة الهوائية تلقائيًا بواسطة مستشعرات السيارة عند حدوث التصادم.
. تنكمش الوسادة الهوائية بنفس سرعة انتفاخها لوجود ثقوب وفتحات بها؛ حتى تسمح للشخص بالخروج من السيارة.

Importance ▸
• It slows the speed of the driver or passenger when his/her body moves forward.
• It absorbs the energy of the car during collision.

. تخفض سرعة حركة الجسم للأمام أثناء التصادم.
. امتصاص طاقة السيارة أثناء التصادم.

Sensors

They tell the airbag to inflate and fill it with gas to provide a soft cushion.

تخبر المستشعرات الوسادة الهوائية بالانتفاخ وتعبئتها بالغاز لتوفير وسادة ناعمة.



Collisions between Trains and Cars



- Every year, there are many accidents in which a train hits a car that may be stuck on the train tracks.
- Trains are much larger than cars and they can travel at a high speed.
- The higher the force when objects collide, the more dangerous it will be during collision.

- تحدث العديد من حوادث تصادم القطارات بالسيارات التي تعلق في قضبانه كل عام.
- إن القطارات أكبر حجمًا من السيارات، ويمكنها السفر بمعدل عالٍ من السرعة.
- كلما زادت قوة التصادم، زادت المخاطر أثناء التصادم.

Note:

- Car airbags cannot protect people in severe collisions with trains.
- لا يمكن للوسائد الهوائية في السيارات حماية الأشخاص عند التصادم الشديد مع القطارات.





Exercises on Lesson 1

1 Choose the correct answer:

1. A wrecking ball is made up of ....
   a. nylon b. wood c. iron d. steel
2. A .... object has the least kinetic energy.
   a. fast-moving and light b. slow-moving and heavy
   c. fast-moving and heavy d. slow-moving and light
3. A moving .... has no engine.
   a. truck b. motorbike c. bike d. car
4. When the wrecking ball hits a building, ...
   a. kinetic energy transfers from the building to the ball
   b. kinetic energy transfers from the ball to the building
   c. sound energy transfers from the ball to the building
   d. thermal energy transfers from the ball to the building
5. When Sarah hits a tennis ball by a bat, the .... of the ball will change.
   a. speed b. direction c. mass d. a and b
6. In cricket, when Adam hits the ball, ...
   a. the ball moves in the same direction
   b. the ball speed decreases
   c. the kinetic energy is transferred from the ball to the bat
   d. part of the kinetic energy is converted into sound energy
7. When the driver stops suddenly, all the passengers will move ....
   a. upward b. forward c. backward d. downward
8. The airbag inflates .... collision, while it deflates fast .... collision.
   a. before - after b. during - before
   c. before - during d. during - after
9. The .... tell the airbag to inflate and fill with gas to provide a soft cushion.
   a. brakes b. sensors c. gas pedals d. speedometers
10. The .... slows the speed of the driver when his/her body moves forward.
    a. steering wheel b. seatbelt c. airbag d. sensor

11. The airbag is made of ....
   a. carton   b. nylon   c. rubber   d. cotton
12. The .... protect(s) the driver from moving forward during collision.
   a. glass window   b. dashboard   c. seatbelt   d. tires
13. A very big truck needs .... to move.
   a. a very small engine   b. a small engine
   c. a very big engine   d. no engine
14. When the objects collide with each other, ... is transferred between them.
   a. time   b. distance   c. energy   d. nothing

2 Put (✓) or (✗):

1. A static truck has more kinetic energy than a moving car. ( )
2. In cricket, the speed of the ball increases when a player hits it. ( )
3. When the player hits the ball, energy transfers from the ball to the bat. ( )
4. The seatbelt is used to keep the driver from moving backward during collision. ( )
5. Seatbelts and airbags save thousands of lives during accidents. ( )
6. Airbags in the car are enough to protect people in a severe collision. ( )
7. A moving object stays in motion if there's nothing that stops it. ( )
8. Airbags may be folded in the car's steering wheel, dashboard, and tires. ( )
9. The seatbelt is one of the safety equipment in cars. ( )
10. After a collision, the airbag deflates at the same speed as it inflates. ( )
11. Because of the seatbelt, the driver cannot see the road clearly. ( )

3 Write the scientific term:

1. It's a famous game in which the player hits the ball with a wooden bat.
2. It's safety equipment used to prevent car passengers from moving forward when the car stops suddenly.
3. It's safety equipment that provides a soft cushion when it inflates automatically with gas during a collision in the car.
4. It's a heavy steel ball that swings on a cable, and it is used in the destruction of building parts.
5. They are found in airbags, and through which gas comes out to let them deflate.

4 Complete the following sentences using the words between the brackets:

(nylon - steel - same - opposite - more - less - plastic)

1. Light objects cause .... damage than heavy objects.
2. Fast objects cause .... damage than slow objects.
3. When the player hits the ball, it moves in the .... direction.
4. The airbag is made of ...., but the wrecking ball is made of ....

5 Complete the following sentences from the words between the brackets:

1. .... energy is usually produced due to collision. (Chemical - Sound)
2. When hitting a ball with a cricket bat, ... energy transfers from the bat to the ball. (potential - kinetic)
3. In a collision, a truck causes more damage than a .... (car - train)
4. Airbags are filled with .... during crashes. (liquid - gas)
5. The .... absorbs the car's energy during collision. (seatbelt - airbag)
6. The seatbelt prevents passengers from moving forward when the car stops .... (gradually - suddenly)
7. Airbags have vents that help them .... after collision. (inflate - deflate)
8. Airbags inflate .... during crashes. (manually - automatically)
9. The .... slows down the driver's speed during a car crash. (airbag - seatbelt)
10. Airbags deflate .... after collision. (slowly - quickly)
11. When objects crash, ... transfers between them. (distance - energy)
12. As a result of hitting a ball with a bat, the .... of the ball will change. (direction - mass)
13. Fast-moving objects cause .... danger than slow-moving objects. (less - more)
14. Airbags absorb the .... of the car during collision. (energy - motion)

6 Cross out the odd word:

1. Car - Bike - Train - Truck
2. Dashboard - Steering wheel - Tires - Car doors

7 Choose from column (A) what suits it in both columns (B) & (C):

Column (A)	Column (B)	Column (C)
1 A moving car	a. has no kinetic energy.	a. has the smallest mass.
2 A static truck	b. has the highest kinetic energy.	b. has no speed.
3 A moving bike	c. has the lowest kinetic energy.	c. has the highest speed.

1 .... 2 .... 3 ....

8 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Wrecking balls	a. may exit in the car's dashboard, steering wheel and doors.
2 Airbags	b. allow the airbags to deflate after collision.
3 Sensors	c. are used to knock down old buildings.
4 Vents	d. detect a car crash and tell the airbag to inflate.

1 .... 2 .... 3 .... 4 ....

9 Study the following figures, then answer the questions below:

1. The following figures represent different moving objects.

			
A moving bike	A moving train	A moving car	A moving motorbike

a. Which vehicle has the biggest mass? (........)

b. Which vehicle consumes the least amount of fuel? (........)

c. Which vehicle doesn't consume any fuel? (........)

d. Do you think that they have the same kind of energy?
Explain your answer. ....

2 From the opposite figure:



a. Which object has the lowest energy and why?
....
b. Which object causes more damage?
....

3 The following figure represents a boy playing a cricket game, complete:
a. The boy uses a .... to hit the ball.
b. The .... energy transfers from the .... to the ....
c. The speed of the ball .... in the .... direction.

4 In the following figures:

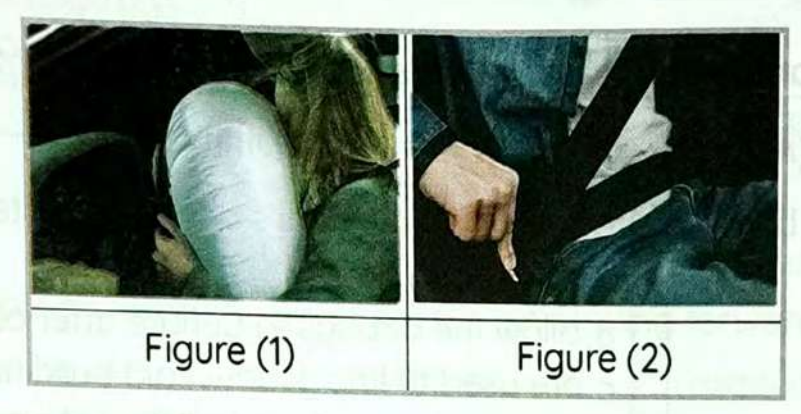


Figure (1)	Figure (2)

Mention the safety equipment in the car.
- Figure (1) represents a/an ....
- Figure (2) represents a/an ....

10 Give reasons for:

1. During a collision, a truck causes more damage than a car.
2. During a collision, a fast-moving car causes more damage than a slow-moving car.
3. Seatbelts and airbags are from the most important safety means in cars.
4. Airbags inflate during a collision.
5. Airbags deflate after a collision.

11 What happens if:

1. A truck collides with a car?
2. The player hits the tennis ball with the bat?

Activity 4 Basics of Speed

Basics of Speed

- Speed is a physical measurement that indicates how fast objects move.
- The direction of the moving object doesn't affect the speed.

• السرعة كمية فيزيائية تُعبر عن مدى سرعة الجسم.
• اتجاه الحركة لا يؤثر على قيمة السرعة.



If a runner moves 5 meters forward in one second and then returns 5 meters backward in one second, his speed remains constant.



Speed: It is the distance traveled per a unit of time.

السرعة : هي المسافة المقطوعة خلال وحدة الزمن.

How to Measure an Object's Speed

We can calculate the object's speed using the following rule:

Speed = Distance ÷ Time

is measured by

kilometer per hour (km/hr) or (Kph)

or

meter per second (m/sec)

Unit 2

Problems

Problem 1:



Calculate the speed of a runner who runs 240 m in 60 seconds.

- Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{240}{60}$ = 4 m/sec.

Problem 2:

If Kenzy rides a bike and covers 150 m in 15 seconds to reach the supermarket, calculate the speed of the bike.

- Speed = $\frac{\text{Distance}}{\text{Time}}$ = .../......... = ... m/sec.

Problem 3:

From the following figures, which car is faster?

The gray car moves 50 meters **in** 2 seconds.



The white car moves 60 meters **in** 2 seconds.



Solution:

Speed = $\frac{\text{Distance}}{\text{Time}}$ = .../.........

= .... m/sec.

Solution:

Speed = $\frac{\text{Distance}}{\text{Time}}$ = .../.........

= .... m/sec.

Concept 3

Comparing the Speed of One Body to Another

1 The relationship between speed and distance (At the same time)



The car covers 500 meters in 5 seconds.

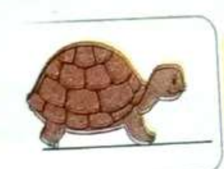


The runner covers 50 meters in 5 seconds.

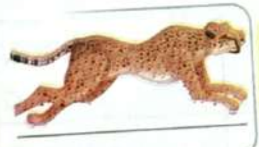
- Car's speed = $\frac{500}{5}$ = 100 m/sec.
- Runner's speed = $\frac{50}{5}$ = 10 m/sec.

- The car has a higher speed because it covers a longer distance in the same time.

2 The relationship between speed and time (At the same distance)



A turtle covers 50 meters in 100 seconds.



A cheetah covers 50 meters in 5 seconds.

- Cheetah's speed = $\frac{50}{5}$ = 10 m/sec.
- Turtle's speed = $\frac{50}{100}$ = 0.5 m/sec.

- The cheetah has a higher speed because the cheetah covers the same distance in a shorter time.

Unit 2

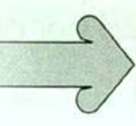
The speed of moving objects depends on:

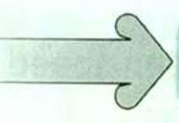
1. The distance covered by the object.
2. The time taken to cover this distance.

To compare the speed of two moving objects:

1. The object that covers a longer distance in the same time has a higher speed.
2. The object that covers the same distance in a shorter time has a higher speed.

- الجسم الذي يقطع أكبر مسافة في نفس الزمن هو الجسم الأسرع.
- الجسم الذي يقطع نفس المسافة في زمن أقل هو الجسم الأسرع.

As distance increases  Speed increases

As time increases  Speed decreases

Which object moves faster?

1	The 1st runner travels 6 kilometers in 1 hour.	
	The 2nd runner travels 9 kilometers in 1 hour.	

2	The 1st car travels 1,000 meters in 5 seconds.	
	The 2nd car travels 1,000 meters in 8 seconds.	

Activity 5 Racing Downhill

Experiment

To show the relationship between speed and kinetic energy

Tools:

Toy trucks	Cardboard	Four books	Paper cup	Scissors	Stopwatch	Ruler

Part 1: Measuring speed

1. Set up an inclined ramp using two books and a cardboard as shown.
2. Roll the toy truck down the cardboard tube.
3. Record the time that the toy truck takes to reach the end of the tube using a stopwatch.
4. Repeat the previous steps by using three books, then four books.
5. Record your results in the table.




Part 2: Measuring kinetic energy

1. Cut a hole in the side of the cardboard large enough to allow the truck to enter without hitting any of its edges.
2. Put the paper cup at the end of the cardboard tube.
3. Roll the toy truck down the tube.
4. Measure the distance that the paper cup moves by using a ruler.
5. Repeat the previous steps by using three books, then four books.








Observations:

Number of Books	Part (1)	Part (2)
	Time (toy truck takes)	Distance (cup travels)
2 books	4 seconds	2 cm
3 books	2 seconds	4 cm
4 books	1 second	6 cm

» As the angle of inclination increases,

- The speed of the truck increases.
- The kinetic energy of the truck increases.

Conclusion:

» Both of speed and kinetic energy increase by increasing the angle of inclination.



» **Study the following figure, then choose the correct answer:**



1. By increasing the number of books, the car covers a ....
   (longer distance – shorter distance)

2. By decreasing the number of books, the car's speed ....
   (increases – decreases)

Exercises on Lesson 2

1 Choose the correct answer:

1. A moving object's speed depends on the ....
   a. distance b. time c. direction d. a and b

2. Which is the fastest object from the following?
   a. A car that moves a long distance in a long time
   b. A car that moves a long distance in a short time
   c. A car that moves a short distance in a long time
   d. A car that moves a short distance in a short time

3. Which is the fastest object from the following?
   a. Car (A) covers 100 meters in one second.
   b. Car (B) covers 200 meters in two seconds.
   c. Car (C) covers 100 meters in two seconds.
   d. Car (D) covers 200 meters in one second.

4. The speed of a car that travels 200 meters in 2 seconds is .... m/s.
   a. 20 b. 40 c. 100 d. 200

5. How can we calculate the speed of an object?
   a. Speed = Distance ÷ Time b. Speed = Distance + Time
   c. Speed = Distance x Time d. Speed = Distance – Time

6. The measuring unit of the distance is ....
   a. km/s b. km c. seconds d. kg

7. The speed of an object is measured in .... or meters per second.
   a. kilometers per hour b. grams per second
   c. hours per kilometer d. kilometers per kilogram

8. The result of dividing the distance traveled by time equals ....
   a. the energy b. the force c. the mass d. the speed

9 Which of the following is a measuring unit of speed?

a. hr/km b. sec/m c. kg/sec d. m/sec

10 Kinetic energy isn't affected by the object's ....

a. mass b. speed c. color d. weight

11 During a collision between ...., the force of the collision increases, and the risks increase.

a. a bicycle and a car b. two cars

c. a train and a car d. two trains

12 If the following objects move with the same speed, which object has the highest kinetic energy?

a. Car b. Bike c. Truck d. Motorbike

2 Put (✓) or (✗):

1 All objects around us move with the same speed. ( )

2 The speed is the distance covered by the object multiplied by the time taken to cover it. ( )

3 The speed of a truck decreases when it takes a longer time to cover the same distance. ( )

4 If a car covered a distance of 10 m in a time of 2 seconds, the speed of the car is 5 m/sec. ( )

5 The speed of the car that covers 75 meters in 3 seconds is 25 km/hr. ( )

6 Car (A) is faster than car (B) if car (A) covers a longer distance than car (B) at the same time. ( )

7 The high-speed moving objects face less danger than the slower objects. ( )

8 As the speed of the car increases, the amount of fuel used decreases. ( )

Concept 3

3 Correct the underlined words:

1. Speed = Distance × Time
2. As the height of the ramp decreases, the object reaches the ground faster.
3. If two cars cover different distances at the same time, they have similar speeds.

4 Write the scientific term:

1. It is the distance covered by a moving object in a unit of time.
2. It's a measurement of whether an object moves fast or slowly.
3. It's the measuring unit of the time taken by an object to cover a distance.

5 Complete the following sentences from the words between the brackets:

1. Km/hr is a measuring unit of .... (distance - speed)
2. If an object covers 6 meters in two seconds, its speed is .... (3 km/hr - 3 m/s)
3. A bike that covers 100 meters in 10 seconds is .... than another bike that covers 150 meters in 30 seconds. (faster - slower)
4. A horse is faster than a human as it covers a .... distance at the same time. (longer - shorter)
5. Speed is a .... quantity. (physical - chemical)
6. Fast objects cause .... danger than slow objects. (less - more)

6 Complete the following sentences using the words between the brackets:

(decreases - increases - less - higher)

1. By increasing the speed of a car, its kinetic energy ....
2. A slow-moving object exerts .... force when it collides with a fast-moving one.
3. A car's speed on an inclined ramp is .... than that on a flat road.

Unit 2

7 Cross out the odd word:

1. Distance - Time - Speed - Direction
2. Meter - Kg - Km
3. Meter - Hour - Second

8 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 The speed becomes zero	a. when an object covers a longer distance in the same time.
2 The speed increases	b. when an object covers the same distance in a longer time.
3 The speed decreases	c. when an object covers the same distance in the same time.
4 The speed remains constant	d. when an object stops moving.

1 .... 2 .... 3 .... 4 ....

9 Which object moves faster?

1	Car (A) travels a longer distance in the same time.	
	Car (B) travels a shorter distance in the same time.	

2	Car (A) travels the same distance in a longer time.	
	Car (B) travels the same distance in a shorter time.	

Concept 3

10 Study the following table, then complete:

	Car (A)	Car (B)	Car (C)	Car (D)
Distance (Meters)	200	200	100	100
Time (Seconds)	4	2	2	5

....

....

....

....

1. Car (..........) is the fastest one, while car (..........) is the slowest one.
2. Car (..........) has the lowest kinetic energy.
3. Cars (..........) and (..........) move with the same speed.

11 Study the following figures, then answer the questions below:

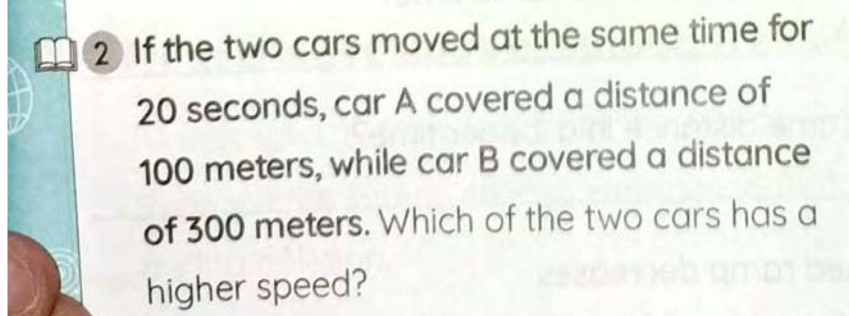
1. Choose the correct words for the following sentences:

(faster - slower - increases - decreases - remains constant)

a. By using two books only instead of three books,
the ball moves .... and its kinetic energy ....

b. By using four books instead of three books,
the ball moves .... and its kinetic energy ....

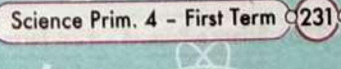
2. If the two cars moved at the same time for 20 seconds, car A covered a distance of 100 meters, while car B covered a distance of 300 meters. Which of the two cars has a higher speed?



....

....



12 Problems:

1. Find the speed of a runner if you know that he covers 40 meters in 8 seconds.

....

....

2. A train travels from Cairo to Alexandria a distance of 200 kilometers in 2 hours. Find its speed.

....

....

13 Give reasons for:

1. An object's speed indicates how fast the object moves.

....

....

2. Different kinds of energies exist during a collision.

....

....

3. Driving fast is so dangerous.

....

....

14 What happens if:

1. An object covers longer distance in the same time?

....

2. An object covers the same distance in a longer time?

....

3. The angle of the inclined ramp decreases (according to the kinetic energy of the object sliding on it)?

....



Lesson 3

Activity 6 Energy and Collision

Collision It is the moment when two moving objects crash.

التصادم: هو لحظة اصطدام جسمين متحركين معًا.

When two cars collide,

- an energy transfer occurs.
  يحدث انتقال للطاقة.
- changes of energy occur.
  يحدث تحولات للطاقة.

Example

» What happens if a boy runs fast and hits a traffic sign?

- The boy stops moving forward.
- The boy may get injured.
- The traffic sign may vibrate (wobble).

• يتوقف الولد عن الحركة للأمام - قد يتعرض للإصابة - قد تهتز إشارة المرور.

From the previous example, we conclude that:

- Kinetic energy transfers from the boy to the traffic sign, so it vibrates.
- Some of the kinetic energy changes to sound and heat energies during collision.

من المثال السابق نستنتج أن:

- تنتقل الطاقة الحركية من الولد لإشارة المرور فتهتز إشارة المرور.
- يتحول جزء من الطاقة الحركية إلى طاقة صوتية وحرارية أثناء التصادم.

Activity 7 The Effect of Speed on Collision

» The kinetic energy of an object depends on:

1 Object's mass. 2 Object's speed.

» The force exerted in an accident depends on the speed and the direction of the two cars.

1 Effects of speed on collisions:

- As an object's speed increases, its kinetic energy increases.

• كلما زادت سرعة الجسم زادت طاقته الحركية.

Fast-Moving Objects

Energy

- They have more energy.

During a Collision

- They exert more force, which causes a big damage that cannot be repaired.

• الأجسام السريعة تمتلك طاقة أكبر.
• عند التصادم تكون قوتها أكبر،
وتسبب ضررًا أكبر لا يمكن إصلاحه.

Slow-Moving Objects

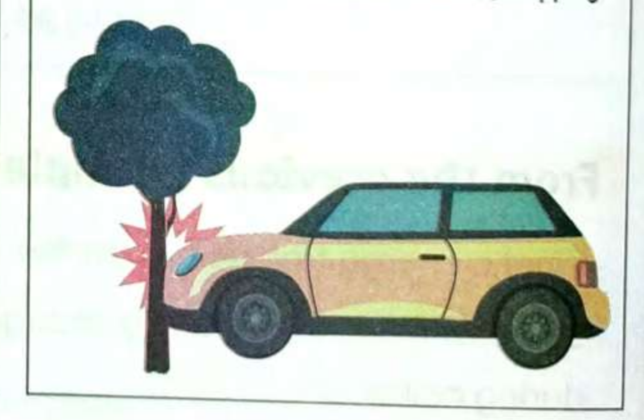
Energy

- They have less energy.

During a Collision

- They exert less force, which causes a small damage that can be repaired.

• الأجسام البطيئة تمتلك طاقة أقل.
• عند التصادم تكون قوتها أصغر،
وتسبب ضررًا أصغر يمكن إصلاحه.



Driving fast is very dangerous.

القيادة السريعة خطيرة جدًا.



2 Effects of direction on collisions:

If two cars move in the same direction and collide,

- The damage will be less severe.
- الأضرار أقل.



If two cars move in opposite directions and collide,

- The damage will be more severe.
- الأضرار كبيرة.



» When a fast object hits another slow object:

- Kinetic energy transfers from the fast car to the slow car.
- Some of the extra energy is transferred in the form of heat, light, or sound energy.

عندما يصطدم جسم سريع بآخر:

- تنتقل طاقة الحركة للجسم الآخر، وتتحول بعض الطاقة الزائدة إلى طاقة حرارية أو ضوئية أو صوتية.

When hitting the rubber ball with the bat, we can observe that a fast-moving ball makes a louder sound than a slow-moving ball.

عند ضرب الكرة المطاطية بالمضرب، يمكننا ملاحظة أن الكرة السريعة تُصدر صوتًا أعلى من الكرة البطيئة.



Exercises on Lesson 3

1 Choose the correct answer:

1. .... energy is transferred between two objects during a collision.
   a. Potential b. Thermal c. Electrical d. Kinetic
2. All these kinds of energy exist during a collision, except .... energy.
   a. sound b. thermal c. electrical d. chemical
3. A collision between moving objects always produces .... energy.
   a. sound b. potential c. electrical d. kinetic
4. During a collision, all the following happen, except ....
   a. energy transfer b. energy changes
   c. energy is destroyed d. damage takes place
5. When a fast runner collides with a traffic sign, all the following happen, except that ....
   a. potential energy is produced b. sound is energy is produced
   c. the boy stops d. the traffic sign vibrates
6. By increasing the speed of moving objects, their .... increase(s).
   a. kinetic energy b. exerted force
   c. resulted damage d. all the previous
7. Which accident causes great damage that can't be repaired?
   a. Two slow cars collide in opposite directions.
   b. Two fast cars collide in the same direction.
   c. Two slow cars collide in the same direction.
   d. Two fast cars collide in opposite directions.
8. The effect of a collision depends on all the following factors, except the .... of the moving object.
   a. direction b. speed c. color d. mass

2 Put (✓) or (✗):

1. A collision between moving objects produces kinetic energy. (   )
2. The effect of collision depends on the speed of the moving objects only. (   )
3. A fast-moving rubber ball makes a louder sound than a slow-moving one when hit by a bat. (   )
4. The driver should drive as fast as possible to avoid any accidents. (   )

3 Correct the underlined words:

1. During a collision, a part of the potential energy is converted into sound energy.
2. By increasing the object's speed, it exerts less force during a collision.
3. The object's potential energy depends on its speed and mass.

4 Write the scientific term:

1. The process in which two or more objects crash into each other, causing an energy transfer.
2. The factor that affects both the potential and kinetic energy of an object.

5 Complete the following sentences from the words between the brackets:

1. A severe crash occurs when two cars are moving in the .... direction. (same - opposite)
2. During the collision of two objects, the kinetic energy transfers from the .... object to the other one. (faster - slower)

6 Study the following figures, then answer the questions below:

1. The following figures represent different collision situations, complete the following using these words:

(sound - car - bike - truck - traffic lights)

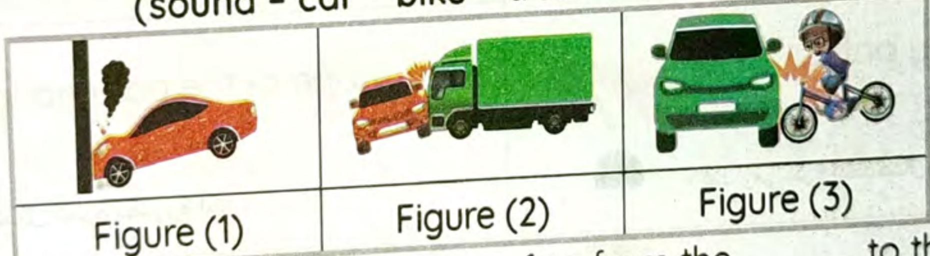


Figure (1) | Figure (2) | Figure (3)

a. In figure (1), kinetic energy transfers from the .... to the ....
b. In figure (2), the .... causes more damage.
c. In figure (3), the .... is exposed to more damage.
d. A collision usually produces ....

2. Which figure represents more severe damage and why?

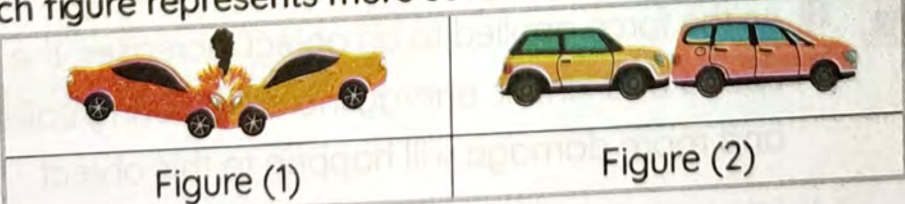


Figure (1) | Figure (2)

7 What happens if:

1. Two cars moving in the same direction crash?
2. Two cars moving in different directions crash?

Lesson 4

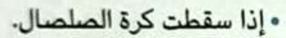
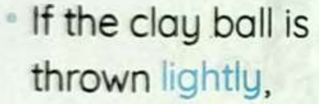
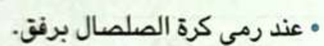
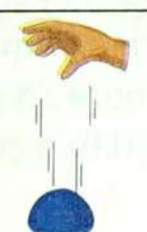
Unit 2

Activity 8 Speed and Collision

» By increasing the force on an object, its speed increases, and its kinetic energy increases.

Activity

To Show the Effect of Force and Speed of a Moving Object on Its Kinetic Energy

Steps	Observations
• If you drop a regular shaped clay ball from your hand towards the floor,  • إذا سقطت كرة الصلصال.	• the shape of the ball changes slightly. • يتغير شكل الكرة قليلًا.
 • If the clay ball is thrown lightly,   • عند رمي كرة الصلصال برفق.	• the shape of the ball changes more. • يتغير شكل الكرة بصورة أكبر.
• If the clay ball is thrown strongly,  • عند رمي كرة الصلصال بقوة.	• the shape of the ball changes much more. • يتغير شكل الكرة بصورة أكبر جدًا.

Conclusions » As the force applied to an object increases, the speed and kinetic energy increase during collision, and more damage will happen to this object.

• مع زيادة القوة المؤثرة على الجسم المتحرك
تزداد سرعة الجسم المتحرك وتزداد الطاقة الحركية له أثناء الاصطدام
وبالتالي سيحدث المزيد من الضرر لهذا الجسم.

Activity 9 The Effect of Mass on Collision

The Relationship Between the Mass of the Objects and Their Kinetic Energy





The truck	The car
has a big mass.	has a small mass.
has a big engine.	has a small engine.
consumes more fuel.	consumes less fuel.
has high kinetic energy.	has low kinetic energy.
causes more damage during a collision.	causes less damage during a collision.

Give a reason for...



- The truck needs a bigger engine to move than the car.

Because the truck has a much larger mass than the car.

What happens if...



1. A vehicle moves faster?

The vehicle consumes more fuel and its kinetic energy increases.

2. The mass of an object doubles?

The kinetic energy of the object will increase.

» As an object's mass increases, its kinetic energy increases.

. كلما زادت كتلة الجسم زادت طاقة حركته.

Heavy objects → have → high kinetic energy → causing → more damage.

Light objects → have → low kinetic energy → causing → less damage.

Effect of Mass on Collisions

If a bike moving with a speed of 50 km/hr hits a person,



the person may get injured only and he/she will survive.

عندما تصطدم دراجة تتحرك بسرعة

٥٠ كم في الساعة بشخص؛

قد يصاب الشخص فقط وينجو من الموت.

If a car moving with a speed of 50 km/hr hits a person,



the person's life may be in danger.

عندما تصطدم سيارة تتحرك بسرعة

٥٠ كم في الساعة بشخص؛

تتعرض حياة الشخص لخطر شديد.

Activity 10 Energy Conservation During Collision



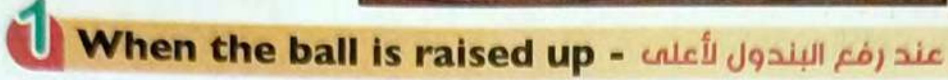
When you play a game with marble:

- Kinetic energy is transferred from your hand to the 1st marble then to the 2nd one and so on.
- Some of the kinetic energy is converted into sound energy, so we hear a click sound during collision.

عندما تلعب بكرات البلي الصغيرة:

- تنتقل الطاقة الحركية من يدك إلى كرة البلي الأولى ثم إلى الثانية وهكذا.
- تتحول بعض الطاقة الحركية إلى طاقة صوتية؛ لذلك نسمع صوت طقطقة أثناء الاصطدام.

Energy Transformation in Newton's Cradle



1 When the ball is raised up - عند رفع البندول لأعلى

- The ball stores potential energy.

• تختزن الكرة طاقة الوضع.

2 When the ball is left to move - عند ترك الكرة لتتحرك

- Potential energy decreases gradually and it is converted into kinetic energy.

• تقل طاقة الوضع تدريجيًا وتتحول لطاقة حركة.

3 When the ball hits the 1st ball next to it - عندما تصطدم الكرة بأول الكرات

- Kinetic energy transfers to the 1st ball, then to the rest of the balls.
- Some of the kinetic energy is converted into:

1. Sound energy produced during the collision between the balls.
2. Thermal energy due to the friction between the strings and other parts of the cradle and between the air and the balls during their motion.

• تنتقل الطاقة الحركية للكرة الأولى ومن ثَمّ لبقية الكرات.

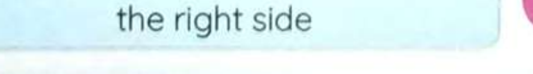
• تتحول بعض الطاقة الحركية لـ:

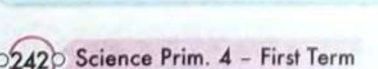
1. طاقة صوتية أثناء التصادم بين الكرات.
2. طاقة حرارية بسبب الاحتكاك بين الخيط والأجزاء الأخرى، وبين الهواء والكرات أثناء التصادم.

In Newton's cradle



The distance moved by the moving balls on the right side	=	The distance moved by the moving balls on the left side
The amount of energy before collision	=	The amount of energy after collision
The number of moving balls on the right side	=	The number of moving balls on the left side







Notes:

- Energy is transferred and converted into other forms, but it can't be destroyed.
- Kinetic energy travels in two opposite directions among moving balls.

What happens if...



1. You leave the balls in Newton's cradle moving long enough.

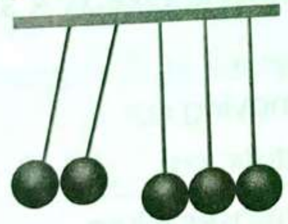
Their kinetic energy decreases gradually until they stop moving after a while.

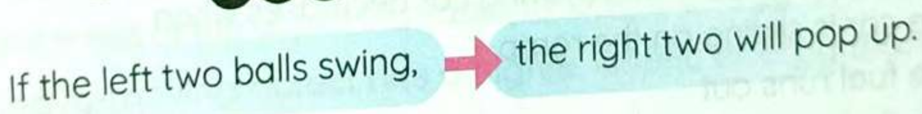
2. Friction between Newton's cradle string and its other parts occurs.

Some of the kinetic energy is converted into thermal energy.

3. You pull two balls in Newton's cradle, then leave them to collide with the rest of the balls.

Kinetic energy transfers from them to the rest of the balls, and two balls will move on the other side.





If the left two balls swing, → the right two will pop up.

Give reasons for...



1. The amount of energy before collision is equal to that after collision.

As kinetic energy is converted into other forms of energy as (sound and heat).

2. You hear a sound from a collision between marbles.

Because some of the kinetic energy is converted into sound energy.

Exercises on Lesson 4

1 Choose the correct answer:

1. By increasing the force acting on the cart, its kinetic energy ....
   a. becomes zero
   b. remains constant
   c. increases
   d. decreases

2. All the following affect the kinetic energy of an object, except ....
   a. the object's mass
   b. the object's speed
   c. the object's color
   d. the force acting on the object

3. The shape of the clay changes slightly when the ball ....
   a. is thrown strongly
   b. is thrown slightly
   c. is dropped from your hand
   d. is dropped from the top of a building

4. A car with a speed of .... kilometers per hour consumes less fuel.
   a. zero
   b. 50
   c. 100
   d. 150

5. Which object has the smallest engine?
   a. A static car
   b. A moving truck
   c. A moving bike
   d. A static train

6. Which object consumes less fuel?
   a. A moving bike
   b. A moving car
   c. A moving truck
   d. A static car

7. The kinetic energy of the moving car decreases when ....
   a. the car is sliding on the ramp
   b. the fuel runs out
   c. the driver applies brakes to decrease the car speed
   d. the driver presses the gas pedal to increase the car speed

8. When a fast-moving car hits a woman in the street, ...
   a. she will survive
   b. she will be injured
   c. her life is in danger
   d. nothing happens to her

9. All the following forms of energy exist in Newton's cradle, except .... energy.
   a. potential
   b. kinetic
   c. chemical
   d. sound

10. In Newton's cradle, the potential energy is converted gradually into kinetic energy when ....
   a. the ball is raised up b. you leave the raised ball
   c. the ball hits the first other ball d. the last ball moves

11. In Newton's cradle, when the raised ball hits the second ball, the last ball moves as kinetic energy transfers to ....
   a. the third ball only b. the second ball only
   c. the last ball only d. all the balls

12. In Newton's cradle, when the ball moves towards the other balls, the potential energy ....
   a. equals zero b. increases
   c. decreases d. remains constant

13. If you leave the moving balls of Newton's cradle long enough, kinetic energy will ....
   a. increase gradually b. decrease gradually
   c. remain constant d. be doubled

14. ...... energy is stored inside the balls in Newton's cradle before leaving it.
   a. Chemical b. Sound c. Kinetic d. Potential

2 Put (✓) or (✗):

1. As the mass of the object increases, its kinetic energy decreases. ( )
2. A heavy-moving object has a higher kinetic energy than a light-moving object. ( )
3. When a moving bike hits a man, he may be injured only and survive. ( )
4. As the force acting on a moving body increases, its speed decreases. ( )
5. Potential energy becomes zero when you raise the ball up. ( )
6. A part of the kinetic energy is converted into sound energy, so we hear a click sound during collision. ( )



Concept 3

7. If two balls in Newton's cradle hit the rest of the balls, only one ball will move to the other side. ( )
8. In Newton's cradle, some of the kinetic energy is converted into thermal energy due to the friction between the strings and other parts during collision. ( )
9. A raised ball in Newton's cradle at 5 cm has more potential energy than a raised ball at 6 cm height. ( )
10. The kinetic energy travels in two opposite directions between the balls in Newton's cradle. ( )
11. In Newton's cradle, the amount of energy before collision is equal to that after collision. ( )
12. In Newton's cradle, the kinetic energy of the balls becomes zero after a lot of collisions as energy is destroyed. ( )

3 Complete the following sentences:

1. As an object moves ...., its kinetic energy decreases.
2. .... energy is affected by the object's speed.
3. If the clay ball is thrown strongly, its shape has .... change.
4. The shape of the clay ball is less damaged when it's thrown ....
5. When a ball in Newton's cradle moves towards the rest of the balls, its .... energy is converted into .... energy.
6. Some of the kinetic energy is converted into .... energy during collision, as we hear it, and some of the kinetic energy is converted into .... energy due to the friction between the strings and the other parts during collision.
7. If you leave the moving balls in Newton's cradle long enough, their kinetic energy will .... until they ....
8. As time passes, the moved distance by Newton's cradle balls .... gradually.

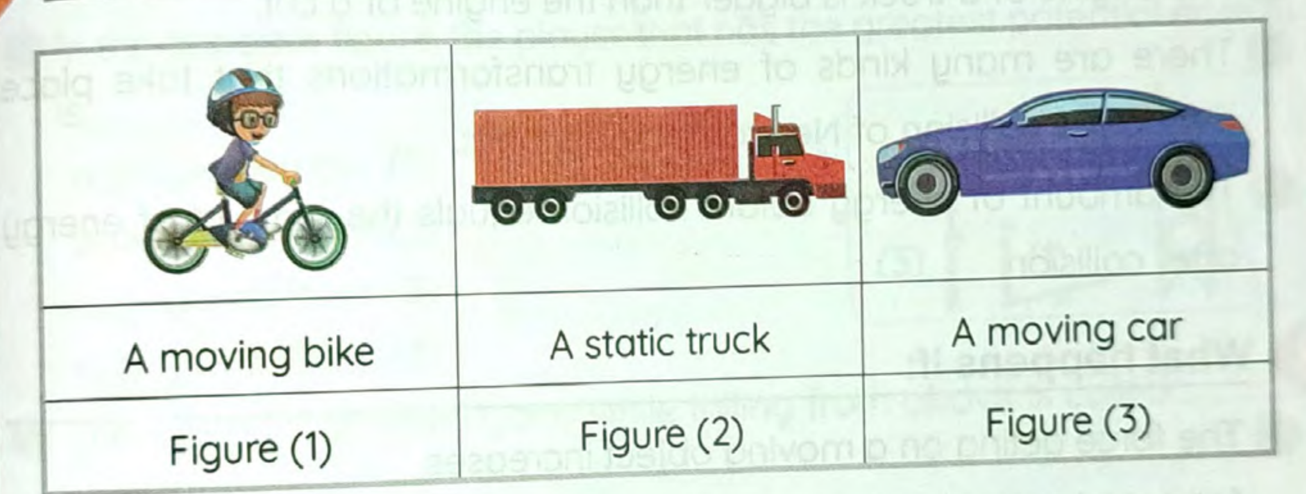


4 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 When the ball is raised up,	a. potential energy changes into kinetic energy.
2 When the ball moves towards the rest of the balls,	b. kinetic energy changes into potential energy.
3 The speed of the moving balls	c. decreases as time passes.
	d. increases as time passes.

1 .... 2 .... 3 ....

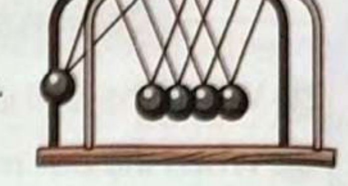
5 Study the following figures, then answer the questions below:



A moving bike	A static truck	A moving car
Figure (1)	Figure (2)	Figure (3)

1. Figure (........) has no kinetic energy.
2. Figure (........) has no engine.
3. Figure (........) consumes fuel.
4. The engine in figure (........) is smaller than the engine in figure (........).
5. The kinetic energy in figure (........) is more than the kinetic energy in figure (........).

6 Arrange the following steps in Newton's cradle:



a ( ) The ball moves towards the rest of the balls.

b ( ) Kinetic energy transfers to all the other balls.

c ( ) The ball is raised up, so it stores potential energy.

d ( ) The last ball moves.

e ( ) The ball hits the first ball.

f ( ) A part of the kinetic energy changes to sound and heat energies.

7 Give reasons for:

1. A moving truck consumes more fuel than a moving car.
2. The engine of a truck is bigger than the engine of a car.
3. There are many kinds of energy transformations that take place during the collision of Newton's cradle balls.
4. The amount of energy before collision equals the amount of energy after collision.

8 What happens if:

1. The force acting on a moving object increases (concerning its kinetic energy)?
2. An object moves faster (concerning its kinetic energy)?
3. A fast-moving bike hits a person?
4. A fast-moving car hits a person?
5. You raise the ball in Newton's cradle up without leaving it?
6. You leave the ball in Newton's cradle to move towards the other balls?
7. The ball in Newton's cradle hits the first ball of the other balls?
8. You leave the moving balls in Newton's cradle long enough?

Assess Your Learning

School Book Questions on Unit 2

1 Choose the correct answer:

1. In the opposite figure, the box is affected by ....

Smaller Force → [box] ← Greater Force

a. balanced forces and moves in the right direction
b. balanced forces and moves in the left direction
c. unbalanced forces and moves in the right direction
d. unbalanced forces and moves in the left direction

2. The force that decreases an object's speed or slows it down is .... force.

a. push b. gravity c. friction d. pull

3. In the opposite figure, the player that has the greatest potential energy is ....

(2) (4) (3) (1)

a. player number (1)
b. player number (2)
c. player number (3)
d. player number (4)

4. The energy that a ball gains while falling from above is called .... energy.

a. potential b. kinetic c. light d. chemical

5. As the inclination angle of a surface increases, the speed of an object rolling on it ....

a. decreases b. increases c. isn't affected d. equals zero

6. On collision, the sum of energies before collision is .... the sum of energies after collision.

a. equal to b. less than. c. more than d. unequal to

7. When a moving car stops suddenly, the body of the passenger moves in the .... direction.

a. right b. left c. forward d. opposite

2 Answer the following questions:

1 In the opposite figure:



(A) Are the forces between the two teams balanced or unbalanced?

....

(B) In which direction would the movement of kids be (right or left)?

....

2 If two cars started to move for the same period of time of 20 seconds, car (A) traveled a distance of 100 meters, while car (B) traveled a distance of 300 meters, which car has the highest speed?

....

3 In the opposite figure:



On releasing the compressed spring, there's a change from .... energy to .... energy.

4 In the opposite figure:



If both the car and the truck move at the same speed, which one causes more damage during the collision and why?

....

....

3 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Gravity	a. is the energy stored in an object.
2 Friction	b. is the force that pulls objects downward.
3 Speed	c. is the force that arises between the surfaces of two objects in contact.
4 Potential energy	d. is the stored energy inside dry cells.
	e. is the distance covered in a unit of time.

1 .... 2 .... 3 .... 4 ....

Project

VEHICLE SAFETY



- Modern vehicles are designed with a lot of safety features, such as seatbelts and airbags, to keep the driver and passengers safe.
- Sometimes a seatbelt is not enough during a collision, so the airbag is added to absorb the energy of the car during the collision.
- Airbags are made of nylon material and are folded inside the steering wheel, seats, dashboard, or doors.
- During a collision, sensors tell the airbag to inflate quickly with the gas to provide a soft cushion for the driver or passengers.





Glossary

Theme 1 – Unit 1 – Concept 1

Lesson (1)

Adapt	يتكيف	Bare feet	حافي القدمين	Availability	توافر
Toes	أصابع القدم	Fats	دهون	Weave around	تلتف حول
Hump	السنام	Polar bear	الدب القطبي	Environment	البيئة
Arctic region	القطب الشمالي	Adaptation	تكيف	Brown bear	الدب البني
Desert lizard	سحلية الصحراء	Caracal	كاراكال (القط البري)	Shaded areas	أماكن الظل
Fennec fox	ثعلب الفنك	Palm leaves	أوراق النخل	Scales	حراشيف
Waxy layer	طبقة شمعية	Fur	فراء	Survive	ينجو
Sneak up	التسلل	Reproduce	يتكاثر	Blend in	يتخفى
Penguin	البطريق	Camouflage	التخفي	Antarctica	القارة القطبية
Predator	المفترس	Dense feather	فراء كثيفة	Prey	الفريسة
Blood vessels	أوعية دموية				

Lesson (2)

Structural adaptation	تكيف تركيبي	Giraffe	الزرافة	Behavioral adaptation	تكيف سلوكي
Arctic region	القطب الشمالي	Migration	الهجرة	Smelly message	روائح مميزة
Habitat	الموطن	Camouflage	التخفي	Lose	يفقد
Acacia trees	أشجار السنط	Strength	القوة	Kapok trees	أشجار الكابوك
Sense of hearing	حاسة السمع	Savannah	مناطق السافانا	Hunting	الصيد
Amazon rainforests	غابات الأمازون	Pants	يلهث	grassland	موطن عشبي
Burrows	جحور	Lack	نقص	Arctic fox	الثعلب القطبي
Soggy soil	تربة طينية	Bull shark	قرش الثور	Roots	الجذور
Countershading	التباين اللوني	Trunk	الجذع	Salt water	المياه المالحة
Leaves	الأوراق	Hand-shaped	شكل كف اليد	Scales	حراشيف
Fresh water	المياه العذبة	Taproot root	الجذر الوتدي	Toes	أصابع القدم
Deep soil	أعماق التربة	Spines = Needles	أشواك	Poison	سُمّ
Buttress roots	الجذور الداعمة				

Lesson (3)

Wetlands	مستنقعات	Digestion process	عملية الهضم	Desert	صحراء
Teeth	الأسنان	Forest	غابة	Tongue	اللسان
Float	تطفو	Saliva	اللعاب	Resist	تقاوم
Crushes	تكسير - تفتيت	Triangular shape	شكل مثلثي	Chewing	المضغ
Cactus plants	نبات الصبار	Facilitates	تسهيل	Systems	أجهزة
Moistens	ترطيب	Organs	أعضاء	Starch	النشا
Digestive system	الجهاز الهضمي	Muscular tube	أنبوب عضلي	Respiratory system	الجهاز التنفسي

English	Arabic	English	Arabic	English	Arabic
Anus	فتحة الشرج	Functions	وظائف	Digestion process	عملية الهضم
Breathing	تنفس	Get rid	تتخلص من	Nutrients	مواد غذائية
Nose	الأنف	Mouth	الفم	Trachea	القصبة الهوائية
Throat (Pharynx)	البلعوم	Two lungs	الرئتان	Esophagus	المريء
Diaphragm	الحجاب الحاجز	Liver	الكبد	Inhalation	شهيق
Stomach	المعدة	Exhalation	زفير	Pancreas	البنكرياس
Bronchi	شعب هوائية	Small intestine	الأمعاء الدقيقة	Bronchioles	القصيبات
Large intestine	الأمعاء الغليظة	Alveoli	الحويصلات الهوائية	Digestive juices	عصائر معدية
Contract	ينكمش	Secrete	يفرز	Relax	يتمدد
Chest	الصدر				

Lesson (4)

English	Arabic	English	Arabic	English	Arabic
Gills	خياشيم	Cars exhausts	عوادم السيارات	Lungs	الرئتان
Soil pollution	تلوث التربة	Inhale	يستنشق	Ecosystem	بيئة
Exhale	يخرج	Asthma	الربو	Human activities	أنشطة الإنسان
Heart problems	أزمات قلبية	Cutting down forests	قطع أشجار الغابات	Replanting	إعادة زراعة
Plowing grassland	تجريف التربة				

Lesson (5)

English	Arabic	English	Arabic	English	Arabic
Amphibians	برمائيات	Sensitive	حساسة	Endangered	معرضة للانقراض
Extinct	تنقرض	Frogs = toads	ضفادع	Species	فصائل
Salamander	سلمندر	Water stream	مجرى المياه	Extinction	الانقراض
Water ponds	مياه البرك	Throwing waste	إلقاء المخلفات	Skin	جلد

Theme 1 – Unit 1 – Concept 2

Lesson (1)

English	Arabic	English	Arabic	English	Arabic
Senses	الحواس	Reflection	انعكاس	Communicate	تتواصل معًا
Sound waves	موجات الصوت	Egyptian mongoose	النمس المصري	Owl	البومة
Chatter	الثرثرة	Recognize	يتعرف	Dolphins	الدلافين
Source	مصدر	Echo	صدى الصوت		

Lesson (2)

English	Arabic	English	Arabic	English	Arabic
Nocturnal animals	الحيوانات الليلية	Nervous system	الجهاز العصبي	Darkness	الظلام
Brain	المخ	Navigate	البحث	Spinal cord	النخاع الشوكي
Extraordinary	خارقة	Nerves	الأعصاب	Bats	الخفافيش
Backbone	العمود الفقري	Mammals	الثدييات	Distributed	يتفرع
Rodents	القوارض	Sensory organs	أعضاء حسية	Bounced from	تنعكس من
Sensory receptors	مستقبلات حسية	Tiny	صغيرة	Reflex	رد فعل
Far	بعيدة	Messages	رسائل	Bowl-shaped face	وجه يشبه الوعاء
Spines	أشواك	Rotate (turn)	يلف	Cactus plant	نبات الصبار

Hind legs أرجل خلفية	Translates يترجم	Zigzag paths مسارات متعرجة
Respond استجابة	Hopping القفز	Jerboa اليربوع
Reaction time زمن الاستجابة		

Lesson (3)

Gather يجمع	Muscles عضلات	Translates يترجم
Automatically تلقائيًا	Receive يستلم	Reflexes ردود الفعل المنعكسة
Blinking إغماض العينين	Rely on يعتمد على	

Lesson (4)

Written symbols رموز مكتوبة	Tones نغمات	Ants النمل
Series of songs سلسلة من الأغاني	Humpback whales الحيتان الحدباء	Feeding Season موسم الغذاء
Colonies مستعمرات	Mating season موسم التزاوج	Individuals أفراد
Sound pitch حدة الصوت	Developed طورت	Rough voice صوت خشن
Different roles أدوار مختلفة	Sharp voice صوت حاد	Nurse ants عاملات النمل
Cane عكاز طبي	Scout Ants النمل الكشاف	Vibrations اهتزازات
Solider Ants جنود النمل	Blind person الشخص الكفيف	Alert ينبه
Pick up يلتقط	Danger nearby خطر قريب	

Theme 1 – Unit 1 – Concept 3

Lesson (1)

Low-light areas أماكن منخفضة الإضاءة	Light source مصدر ضوء	Dark areas أماكن مظلمة
Emit يبث	Glow تلمع	Torch كشاف ضوئي
Fishing cat القط السماك	Candle شمعة	Wild cat القط البري
Electric lamp مصباح كهربي	Night vision goggles نظارات الرؤية الليلية	Wider أكثر اتساعًا
Mirror-like membrane غشاء يشبه المرآة	Dim light أضعف درجات الضوء	Pupil حدقة العين

Lesson (2)

Mirror المرايا	Rough surface جسم خشن	Metals المعادن
Lenses عدسات	Absorbed الممتص	Shadow الظل
Pass = transmit يمر	Scatter يشتت	Transparent materials أجسام شفافة
Straight lines خطوط مستقيمة	Opaque materials أجسام معتمة	Direction اتجاه

Lesson (3)

Fireflies الخنافس المضيئة	Regular intervals فترات منتظمة	Chemical reaction تفاعل كيميائي
Traffic lights إشارات المرور	Wings أجنحة	Lighthouses منارات السفن
Warn off predators تحذير من المفترسين	Electronic reader قارئ إلكتروني	Attract a mate جذب رفيق

Lesson (4)

Wave يلوح	Thumbs الإبهام	Rescue flare شعلة إنقاذ
Facial expressions تعبيرات الوجه	Hikers الرحالة	decodes يفك شفرة
Code الشفرة	Sailors البحارة	

Theme 2 – Unit 2 – Concept 1

Lesson (1)

Static ساكن	Rocket صاروخ	Motion الحركة
Fitted مثبت	Force القوة	Engine محرك
Speed السرعة	Parachutes باراشوت (مظلة هبوط)	Push force قوة الدفع
Air force قوة الهواء	Pull force قوة السحب	Shockwave أسرع شاحنة في العالم
Bag حقيبة	Leaves أوراق شجر	Truck شاحنة
Engineers مهندسون	Jet airplane طائرة نفاثة	Fire extinguisher طفاية حريق
Distance مسافة	Cart عربة تسوق	

Lesson (2)

Balanced forces قوى متزنة	Chair كرسي	Unbalanced forces قوى غير متزنة
Drop تسقط	Tug-of-war لعبة شد الحبل	Act on تؤثر على
Gravity الجاذبية	Rotation دوران	

Lesson (3)

Friction force قوة الاحتكاك	Stop يوقف	Touching surfaces أسطح متلامسة
Gently برفق	Slow down يبطئ	Hard بقوة

Lesson (4)

Energy الطاقة	Flat road طريق مستو	Work الشغل

Theme 2 – Unit 2 – Concept 2

Lesson (1)

Kinetic energy طاقة الحركة	Sliding الانزلاق	Potential energy طاقة الوضع
Height الارتفاع	Stores يخزن	Electric devices أجهزة كهربية
Chemical energy الطاقة الكيميائية	Hill تل - منحدر	Thermal energy الطاقة الحرارية
Roller coaster قطار الملاهي السريع	Light energy الطاقة الضوئية	Upward لأعلى
Electrical energy الطاقة الكهربية	Downward لأسفل	

Lesson (2)

Exert يبذل	Position موضع	Ability القدرة
Gain يكتسب	Change يتغير	Tower برج

Lesson (3)

Sound waves موجات الصوت	Washing machine غسالة	Light waves موجات الضوء
Flashlight كشاف الضوء	Water particles جزيئات الماء	Oven فرن

Wires أسلاك	Fan مروحة	Compressed spring زنبرك مضغوط
Bell جرس		

Lesson (4)

Robot إنسان آلي	Powered by يستمد طاقته من	Invent يخترع - يبتكر
Create يخلق		

Theme 2 – Unit 2 – Concept 3

Lesson (1)

Collision = crashing تصادم	Airbag الوسادة الهوائية	Heavy objects الأجسام الثقيلة
Seatbelt حزام الأمان	Light objects الأجسام الخفيفة	Folded مطوية
Truck شاحنة	Steering wheel عجلة القيادة	Damage دمار
Dashboards لوحة التابلوه	Wrecking ball كرة الهدم	Inflate تنتفخ
Swing معلقة من أعلى	Deflate تنكمش	Construction workers عمال البناء
Automatically تلقائيًا	Bat مضرب	Absorb تمتص
Collide = hit يصدم أو يضرب	Sensors المستشعرات	Cricket لعبة الكريكيت
Seats المقاعد	Safety equipment وسائل الأمان	Train tracks قضبان القطارات

Lesson (2)

Physical measurement كمية فيزيائية	Distance مسافة	Remains constant يظل ثابتًا
Time زمن	Speed سرعة	Inclined ramp مستوى مائل

Lesson (3)

Transfer تنتقل	Object's mass كتلة الجسم	Traffic sign إشارة المرور
Severe ضرر	Get injured يصاب	Louder sound صوت أعلى
Vibrate تهتز		

Lesson (4)

Clay صلصال	Energy Conservation تحولات الطاقة	Fall يسقط
Raise a ball up يرفع الكرة لأعلى	Thrown slightly رمى برفق	Engine محرك
Thrown strongly رمى بقوة	Newton's cradle بندول نيوتن	Destroy يدمر
Marble ball كرة البلي	Survive ينجو	Gradually بالتدريج
Store تخزن	Vehicle سيارة (مركبة)	

PONY

2024

سلسلة كتب الأستاذ

SCIENCE

يُصرف مجانًا مع الكتاب

FINAL REVISION

4th PRIMARY FIRST TERM

BY
Ahmed Omara

Contents

1 Summary



Unit 1 Concept 1

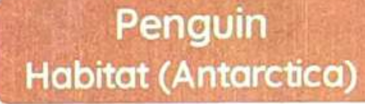
Adaptation and Survival

Adaptations: They're the characteristics that help living organisms survive and reproduce in their ecosystems.

- If a living organism adapts, it will survive and reproduce.
- If a living organism can't adapt, it will die or go extinct.

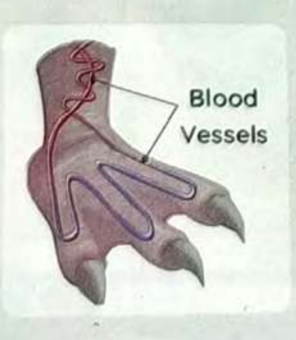
P.O.C	1 Structural (Physical) Adaptation	2 Behavioral Adaptation
Definition	• It's a change that happens in the structure of the living organism's body.	• It's a change that happens in the behaviors (acts) of a living organism.
Examples	• The blood vessels in a penguin's feet • The thick fur of the polar bear	• The desert lizard looking for shade • Bird's migration

1 Adaptation in Animals





- A penguin has a thick fat layer and dense feathers on its body.
- To keep its body warm in the cold weather.



- A penguin's feet don't have feathers or a fat layer, but a penguin can stand on ice all day.
- Because the blood vessels that carry warm blood from its body weaves around the blood vessels that carry cold blood from its feet.
- Note:
  - Warm blood moves down from its body to its toes.
  - Cold blood moves up from its toes to its body.

		Ecosystem Habitat	Way of Adaptation
1 Polar Bear		Arctic regions	It has thick fur. To keep its body warm. It has white fur. To blend in with the snow to sneak up on the prey.
2 Brown Bear and Black Bear		Forests	They have dark fur. To hide among trees during hunting.
3 Caracal and Fennec Fox		Deserts	They have tan-colored (brown) fur. To hide and blend in with the desert environment.
4 Lizards		Deserts between colorful rocks	They have colorful scales. To hide among the rocks in the desert.

Camouflage: It is a type of adaptation that some animals use to hide from predators or sneak up on prey by blending in with the surrounding environment.



Bull Shark
Lives in fresh and salt water



Structural Adaptation	• It uses a camouflage strategy called "countershading", as it has a dark back and a white belly. To sneak up on the prey. • It has sharp teeth. To cut the prey's flesh.
Behavioral Adaptation	• It can hunt in salt and fresh water. • It can hunt at day and night to surprise its prey. • It feeds on different types of food (varied diet). Note: In fresh water, a bull shark has less competition for finding food.

		① Fennec Fox (Habitat: Desert)	② Arctic Fox (Habitat: Tundra)
			In Winter / In Summer
Structural Adaptation	Fur (coat)	It has tan (brown) fur. To hide in the desert environment.	It has a thick fur coat. To help it stay warm. It has white fur in winter and brown fur in summer. To hide from the prey in any season.
	Ears	It has extra-large ears. To lose heat and cool its body.	It has short ears and legs. To help it stay warm.
Behavioral Adaptation		It pants like dogs. To cool its body.	
		They hide in burrows to overcome extreme climate, where the fennec fox stays cool in burrows on sunny days, and the Arctic fox stays warm in burrows at night.	
		They eat different kinds of food (varied diet), such as insects, fruits, plant roots and prey remains. Because it is hard to find any food in the desert.	

Panther Chameleon
Lives in tropical rainforests

Structural Adaptation	• It has bright-colored scales. - To hide and blend in with the surrounding environment. • Its eyes move in opposite directions independently. - One eye searches for food and the other eye to avoid danger. • It has V-shaped feet and a tail like a hand. - To hold the branches of trees tightly.
Behavioral Adaptation	In danger, it scares its attacker by: - Puffing up its body with air. - Opening its mouth wide. - Changing its scales color.

2 Adaptation in Plants

- Plants can grow everywhere, and they have structural and behavioral adaptations, like animals, that help them survive in different environments.



Plant	Habitat	Structural Adaptation	Reason
1 Water Lily	Wetland (Fresh water)	• It has wide leaves that float on the water.	• To absorb a lot of sunlight.
2 Palm Tree	Desert	• It has thick roots and narrow leaves.	• To resist the strong wind.
3 Pine Tree	Snow	• It has a triangular shape and short branches.	• To allow the snow to slide easily over the branches without breaking them.
		• It has needles instead of leaves.	• To prevent water loss.
4 Mangrove Tree	Salt water	• It has long and strong roots.	• To resist the water waves.
5 Barbary Fig	Desert	• It has sharp spines and a tough outer cover.	• To prevent animals from eating its leaves and fruits.

P.O.C.	Acacia Tree	Kapok Tree
Habitat	Savannah grassland (in Africa) • Grassland habitat • The temperature is mild. • Lack of water (drought conditions)	Amazon rainforests (in Brazil) • It has soggy soil. • It is characterized by the strong wind. • It's easy to find water as there's plenty of it.
Shape	Both of them are "Umbrella-shaped trees."	
	Structural Adaptation	
Roots	• Taproot roots (grow downwards) - It reaches 35 meters below the surface. To search for water in deep soil.	• Buttress roots (grow upwards) - To fix the tree firmly in the soggy soil.
Trunk	• Its trunk stores water as camels store fats in their humps. • It has a too long trunk. (Only a giraffe can reach its leaves.)	• The length of the tree exceeds 70 meters to reach the sunlight.
Leaves	• Tiny leaves to hold water. • Sharp spines to protect it.	• Hand-shaped leaves with narrow parts To allow the wind to move gently without tearing them.
	Behavioral Adaptation	
	When a giraffe eats its leaves: • It produces poison. • It sends smelly messages to nearby trees to start producing the same poison.	It sends messages through the wind, such as: • Its delicious-smelling flowers • The tree's fluffy yellow seeds

Human Digestive System

Digestion • It's the process of breaking down food into the simplest form to provide the body with nutrients.

Function of the digestive system:

The digestive system breaks down the food, so the body can use it to get energy.

Important Note:

- The digestive system starts with the mouth and ends with the anus.

Digestion Process Pathway:

Mouth → Throat → Esophagus → Stomach → Small Intestine → Large Intestine → Anus

Pancreas and liver pour their juices. (into the Small Intestine)

How does the digestive system work?

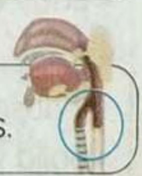
1 Mouth

- Digestion of food starts in the mouth.

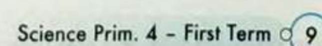
Teeth	• They crush (break) the food during chewing.
Saliva	• A liquid substance that moistens the food. • It breaks down food chemically.
Tongue	• It mixes the crushed food with saliva.

- Chewing food breaks it up mechanically.
- The saliva breaks down the food chemically.

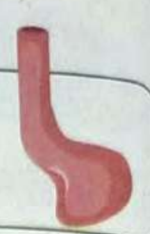
2 Pharynx (Throat)



- When you swallow, your throat pushes the food into the esophagus.



3 Esophagus



- It is a long muscular tube that moves the food down into the stomach.

4 Stomach

- It is a muscular organ.
- Function of the stomach:

  The stomach mixes the food with the acidic and digestive juices (enzymes) until it becomes a soupy liquid.
- The food stays in the stomach for a few hours.
- Then, the muscles of the stomach move the food into the small intestine.

5 Small Intestine

- It's a long, winding tube. (More than six meters long)

Function of the liver and pancreas:

- They pour juices into the small intestine that help break down food into nutrients.

Function of the small intestine:

- The nutrients from the food are absorbed through the walls of the small intestine to enter into the tiny blood vessels.

Then:

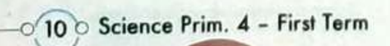
- The blood carries nutrients to all body parts.
- Undigested food flows into the large intestine.

6 Large Intestine

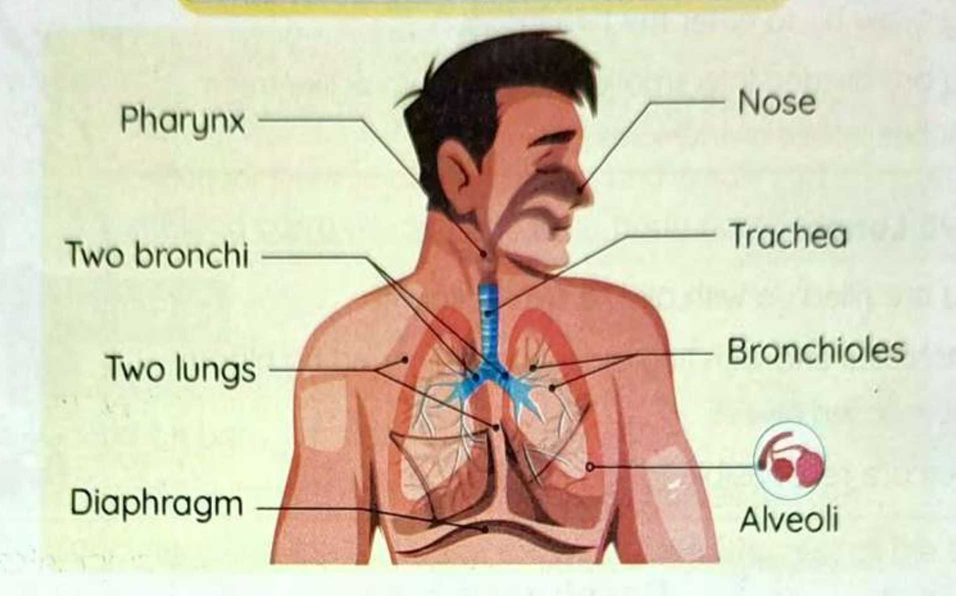
- It's a tube that starts from the end of the small intestine and ends with the anus.

Function of the large intestine:

- It absorbs water from the undigested food, so that they become solid waste.
- Solid waste leaves the body through the anus.



Human Respiratory System

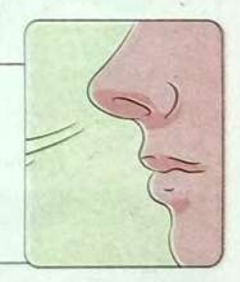


Respiratory Process Pathway:

Nose → Pharynx → Trachea → Two Bronchi → Bronchioles → Alveoli

How does the respiratory system work?

1 Nose:



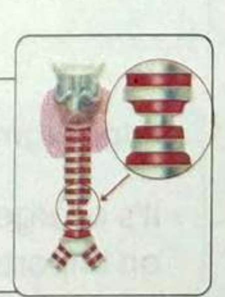
- It is the first organ of the respiratory system.
- Air enters the body through the nose and mouth.

2 Throat (Pharynx):



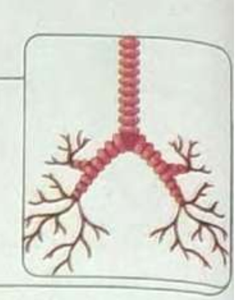
- It allows air to pass to the trachea.

3 Trachea:



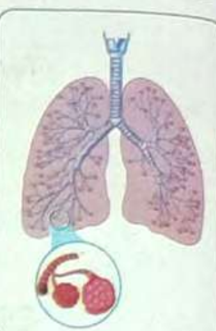
- It's a tube that allows air to pass to the two lungs.
- Inside the lung, it is divided into two bronchi at its end.

4 Two Bronchi:



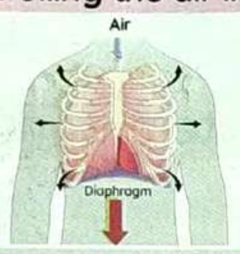
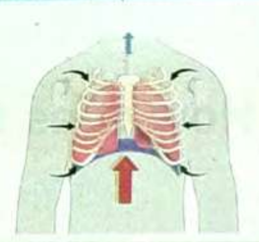
- They allow air to enter the two lungs.
- They are divided into smaller tubes that look like trees' branches called bronchioles.

5 Two Lungs:

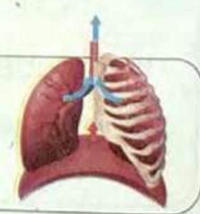


- They are filled up with air like two balloons.
- Bronchioles end with tiny air sacs surrounded by blood vessels called alveoli.
- Alveoli are responsible for gas exchange.

Respiration includes

Inhalation Process "Pulling the air in"	Exhalation Process "Pushing the air out"
 	
Diaphragm	
Moves downward (Shrinks or contracts)	Moves upwards (Relaxes or expands)
Chest Size	
Increases (Enlarges)	Decreases (Becomes narrower)
Type of Air	
Air rich in oxygen gas enters the lungs.	Air rich in carbon dioxide gas is expelled out the lungs.

Diaphragm:



- It's a large muscle at the base of your ribs that has an important role during inhalation and exhalation.

	Human	Fish
Differences	Humans have lungs. So, they live on land.	Fish have gills. So, fish live underwater.
Similarities	• Both of them inhale oxygen gas and exhale carbon dioxide gas. • Blood carry oxygen gas to all body parts.	

How do fish breathe?

- Fish have gills to breathe underwater.
- Gills are found on both sides of a fish's head.
  1. Water enters the mouth of a fish and passes across the gills.
  2. The blood vessels in the gills carry oxygen gas to the rest of the body, and release carbon dioxide gas.

Amphibians

- They are small animals that live in moist environments (rainforests - streams - ponds) such as:

Frogs  Toads  Salamanders 

Respiration in amphibians

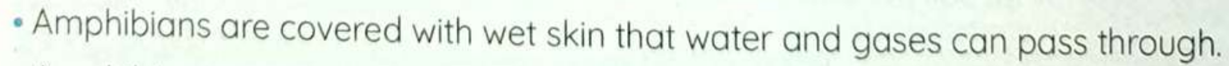
On Land

- They can breathe through their lungs (like humans).

In Water



- They can also extract oxygen from water using their skin (Structural Adaptation)



- Amphibians are covered with wet skin that water and gases can pass through.
- Amphibians are very sensitive to any environmental pollution.

Factors that cause extinction of amphibians:

1. Air pollution
2. Water pollution (Viruses in water)

Human activities that change the environment

1. Cutting down forests
2. Plowing grasslands or clearing lands
3. Building communities
4. Air pollution (Cars exhausts and factory pollution)

People living in cities are exposed to a high level of air pollution that causes:

Lung damage	Asthma	Heart problems

5. Water and soil pollution (Dumping waste in waterways or soil)
6. Introducing plants and animals too an ecosystem that they were never a part of

Living organisms are affected by changes in the ecosystem.

Animals	Some animals can survive by moving to another ecosystem.
Plants	Plants must rely on their seeds landing in a better place for them to survive and grow.
Humans	1. Air pollution (smog) makes it hard for humans to breathe. 2. Water pollution makes it hard for humans to find clean water. 3. Soil pollution makes the crops not grow.

The role of humans to help restore the ecosystem:

1. Replanting cleared forests
2. Removing air and water pollutants
3. Preserving native plants and animals



Senses at Work

- **Animals have sharper senses than humans to:**
  1. Adapt to the environment.
  2. Search for food.
  3. Protect themselves.
  4. Communicate together.



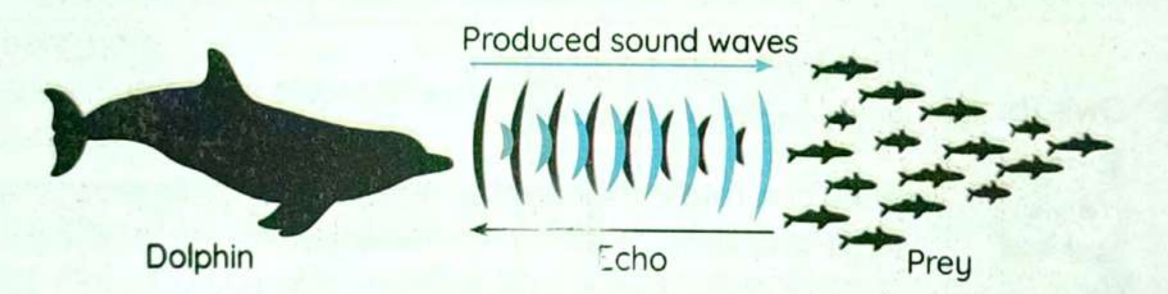


Egyptian Mongoose

- It communicates with other mongooses by producing sounds like chatter to move and search for food.



Dolphins



- **Dolphins** uses a **property** known as "echolocation" that depends on "echo" to locate their preys and objects in the dark water.

How do dolphins locate things?

1. Dolphins produce sound waves through the water.
2. When these waves hit any object, they return to the dolphins as an echo.
3. Dolphins use their sharp hearing sense to detect echoes.

Nocturnal Animals

- Some animals are active at night and are known as "nocturnal animals."

Why do nocturnal animals hunt at night?

1. The nocturnal animal may live in a hot region, so it prefers to look for food at night.
2. Some prey are only available at night.
3. Some animals depend on complete darkness to surprise their prey.

Nocturnal Animal	Adaptation	Reason
1 Bats (mammals)	• Bats can't see in the dark. • They use echolocation and their super hearing sense.	• To locate their prey (insects).
2 Owls (birds)	• They have extraordinary sight and hearing senses.	• To locate their prey.
	• They can rotate their heads in all directions.	• To search for the prey everywhere.
	• They have bowl-shaped faces and feathers in their heads.	• To detect distant sounds and quiet movements.
3 Jerboas (Desert rodents)	• They have large ears.	• To help them hear the noise of nearby moving snakes.
	• Their feet and toes have hair.	• To grip the sand when they jump in zigzag paths.
	• They have long hind legs.	• To enable them to jump for long distances.

Nervous System

- Mammals, such as humans, elephants, and dogs have the same nervous system.
- The five sensory organs (eyes, nose, ears, tongue, and skin) are part of the nervous system.
- The components of the nervous system are connected together by nerves.

Structure:

Brain



The main control center of the body.

Spinal Cord



It carries messages from the brain to the body, and vice versa.

Nerves



They carry messages from the brain to the spinal cord and other body parts, and vice versa.

- The brain is connected to the spinal cord by nerves that pass through the backbone.
- The spinal cord branches are distributed through all body parts.
- Some nerves are connected directly to the brain, such as the eyes' nerves.

Brain
Spinal Cord
Nerves

Importance of the nervous system

1. Gathering information about what is happening inside or outside the body.
2. Understanding what this information means.
3. Telling the body what to do.

How does the nervous system work?



1. The sensory receptors near the organs (eyes - ears - nose - tongue - skin) gather information about what's happening inside and outside your body.
2. The nerves carry the information from the sensory receptors to the brain.
3. The brain processes this information and translates it.
4. The brain sends a response to the body to tell it what to do.

Reflex action: It's a type of messages that are so fast you are barely aware of them.

Examples
- You move your hand away when you touch a hot object.
- You blink your eyes when something comes near them.

Reaction time: It's the time taken by an organism's body to respond to danger and move away from it.



When a girl touches the spines of a cactus plant, she will withdraw her hand quickly in less than one second.



When a jerboa hears a snake moving nearby:
- The sensory receptors in its ears send a message through the nerves to the brain.
- The brain translates this information and gives a response by alerting its legs to jump.
- The jerboa's strong hopping legs start to jump away to escape from danger in less than one second.

1 Human Communication

- People first started sharing information using written symbols.
- Technology systems allow us to call, text, and send email messages over great distances

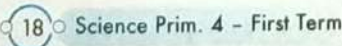
2 Ant Communication



- Ants live in colonies that contain thousands of individuals.
- Ants use their sense of smell to communicate.

- Ants have developed systems that help them divide their work.
- Groups of ants within a colony have different roles.

1 Nurse Ants	**Nurse ants send strong smelly messages.** GR To alert scout ants that responsible for locating food.
2 Scout Ants	They search for food and locate it.
3 Soldier Ants	They use smells to communicate if there is danger nearby





3 Humpback Whales Communication



- They sing a wide range of tones and a series of songs to communicate.
- The songs of humpback whales have different sound pitches depending on the season.
- Winter is considered the mating season.
- Summer is considered the feeding season.



Notes:



- A man has a rough voice. (Low-pitched sound)
- A woman has a sharp voice. (High-pitched sound)



4 Bats

- Bats also use sound to get information about their surroundings.



1. A bat produces a high-pitched sound.
2. The sound hits the object and reflects back.
3. The bat hears the echo (reflected sound).
4. The bat locates the object nearby.

Cane (Bat-Inspired Technology)



- Scientists created a cane that emits high-pitched sounds to help blind people detect their surroundings.
  1. As a blind person walks, a special cane picks up the echo of the high-pitched sounds.
  2. The echo is turned into vibrations that the person can feel using his/her thumb.
  3. These vibrations tell the blind person about nearby bodies.

Unit 1 Concept 3

Light and Sight



- Humans see objects less clearly in dim light.
- Humans can't see anything in complete darkness.
- Humans eyes need night vision goggles to see in the dark.

Humans need a source of light to see clearly.

Source of Light • It's something that emits (gives off) its own light.

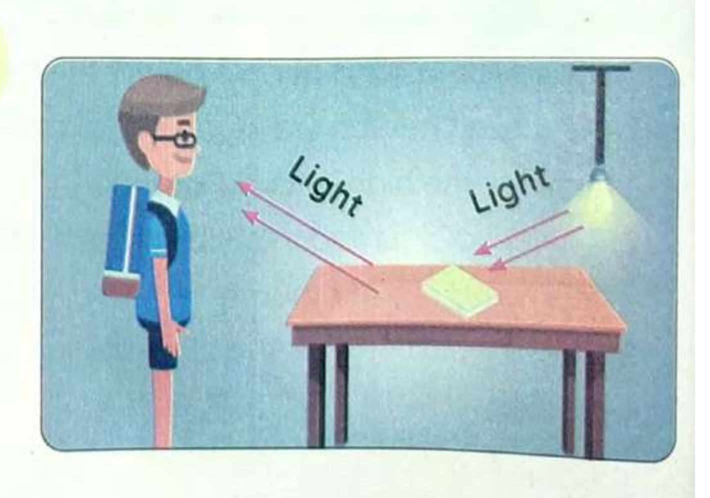
The Sun	Electric Lamp	Fire	Flashlight	Candle
				

- The Sun is considered a natural source of light.
- The moon is not a source of light because it reflects the sunlight falling on it.





How can we see things?



1. A source of light emits light.
2. Light falls on the object.
3. Light bounces off the object for the eyes to see it.
4. Sensory receptors in the eyes send the message to the brain.
5. The brain forms a picture about what we see.

Light Reflection

How does light reflect?

Smooth (Shiny) Surface	Rough Surface
• A smooth surface reflects most of the light rays falling on it. • Light rays are reflected in the same direction with the same angle.	• A rough surface reflects some of the light rays falling on it. • Light rays are diffused/scattered in different directions.
• Mirrors • Metals	• Wood • Papers • Clothes

• Light is a visible form of energy that travels in a straight line in the form of waves.

Transparent Materials	Opaque Materials
• They are the materials that allow light to pass through.	• They are the materials that don't allow light to pass through.
• Things behind them can be seen.	• Things behind them can't be seen.
Examples • Air • Water • Windows • Lenses	**Examples** • Human body • Wood • Metal

• Shadow happens when light falls on an opaque object.

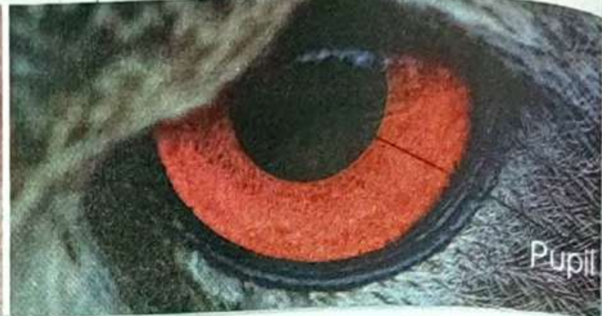


Nocturnal Animals

- Nocturnal animals can see better than humans in the dim light.

- Nocturnal animals have bigger eyes than humans.
- The pupils of the eyes of nocturnal animals open wider than the pupils of human eyes.





Fishing Cat

Its eyes seem to glow in the dark (structural adaptation).

- Because they have a mirror-like membrane on the back of the eye, that reflects the light entering the eye and allows it to collect more available light.



Fireflies Communication



Habitat: They live near mangrove trees in Thailand.

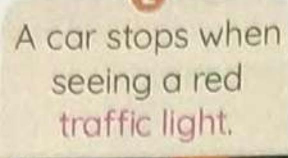
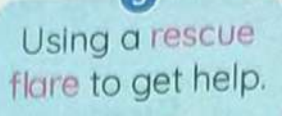
- Fireflies are not flies. They are actually winged beetles.
- Fireflies produce a chemical reaction inside their bodies that allows them to light up.

Fireflies use their wings to flash at regular period of time (intervals) to

1. warn off predators.
2. attract a mate.



Examples of information that the eyes receive

1. You see your friend waving.
2. A car stops when seeing a red traffic light.
3. Using a rescue flare to get help.
4. Hikers use mirrors to attract rescue helicopters.








Note:

- In the past, humans used signal fires to communicate from a distance.

- Humans use codes to transmit information.

Code • It is a pattern that has a meaning.

1 Thumbs-up or Thumbs-down	
2 Facial expressions: They help people know what we feel.	
3 Language: It is a code in the form of sound. Different languages have different codes, but they transmit information.	
4 Writing: It is a code in the form of symbols or arranged letters giving a specific meaning.	
5 Music or sounds: They are used to encode messages.	
6 Lighthouses: They encode information in flashes to guide sailors in dangerous water.	

- Sense organs receive information and send it to the brain.
- The brain decodes and interprets the meaning.

Unit 2 Concept 1

Starting and Stopping

First Motion



- An object stays static when it doesn't change its position because there is no force acting on it.



- An object moves when it changes its position because there is a proper force acting on it.

Motion: It is the change in an object's position as time passes relative to a fixed point.

To move any static object:

1. A pushing or pulling force must act on it.
2. A change in the position happens as time passes.

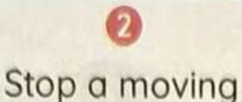
Some motion is

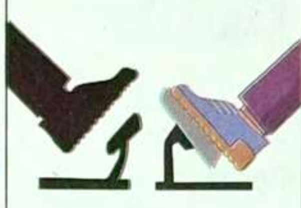
Easy to be seen			Hard to be seen
Walking	A leaf falling	Throwing a ball	Rotation of Earth around the Sun

Second Force

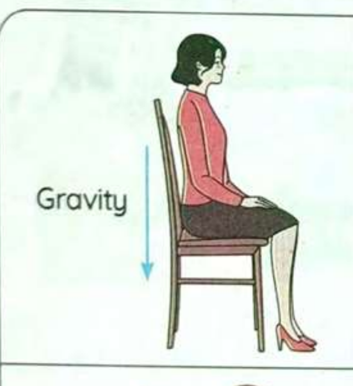
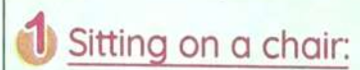
Force: It is a push or pull applied on an object to change its position.

The force can:




1 Move a static object.	2 Stop a moving object.	3 Change the object's speed.	4 Change the object's direction.
			

The direction of force is determined by the total force applied on the object.

	 **1 Sitting on a chair:** • Gravity is pulling the girl downwards.
	**2 Holding objects:** • The man's arm is pulling the bag upward, while gravity is pulling the bag downward.

Gravity: It's the force that pulls the objects downward to the Earth's center.

By increasing the acting force on a body:

- Its speed and kinetic energy increase and the distance covered by the body increases.

When we push a car gently, the car moves slower and covers a shorter distance.



When we push a car hard, the car moves faster and covers a longer distance.

By applying the same force on different objects:

- The small car moves for a long distance.
- The big truck moves for a short distance.



Force → gives us → Energy → that enables us to do → Work

Energy: It is the ability to do work.

Work: It is the effect that changes energy into work done.

The boy who pushes the wall doesn't do any work.

Because the wall doesn't move.

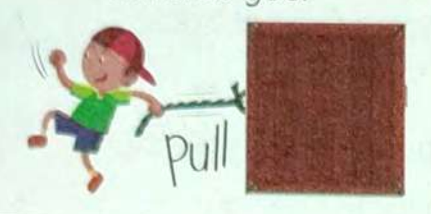


Third Force Types

1 Pushing and pulling forces

Pulling

A force that moves an object towards you.



Pushing

A force that moves an object away from you.



2 Balanced and unbalanced forces

In a tug-of-war game, two teams pull the rope in opposite directions.

Balanced Forces

The rope doesn't move when the forces acting on it are balanced.



Unbalanced Forces

The rope moves towards the greater force when the forces acting on it are unbalanced.



3 Air force

Air force (wind blowing) can move some objects, such as the tree leaves.

How did engineers prove that air causes movement?

- Engineers attached a fire extinguisher to a cart.
- When air is released backward, the cart begins to move forward.



- By increasing the number of fire extinguishers, the speed of the car increases and it covers a longer distance.

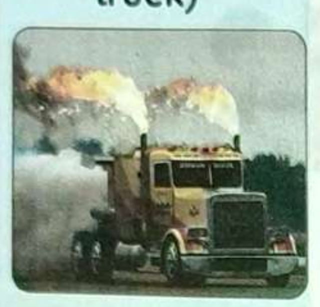


Fourth Moving Objects



- A jet engine is much more powerful than a normal engine. So, an airplane is much faster than a truck.

Shockwave (World fastest truck)



- It has three jet engines.
- Its speed can reach 500 kilometers per hour.
- It is five times faster than a normal truck.

How does it move?

It moves by the pushing force of its powerful jet engines.

How does it stop? (As a rocket design)

Engineers installed three parachutes that help the driver to slow it down quickly.

Fifth Stopping Objects

A moving object stops when a force acts on it with the same amount, but in the opposite direction.

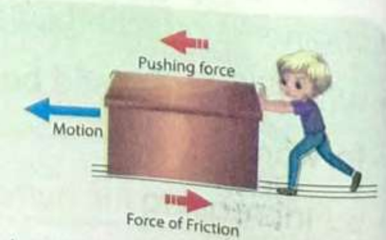
Collision

- When a moving car crashes into a wall, it stops.
- Because the wall applied a force to the car with the same amount and in the opposite direction.



Friction Force

- It is a force that arises when two surfaces rub against each other.
- It acts in the opposite direction of the motion.
- It always slows down or stops the moving object.



Unit 2 Concept 2

Energy and motion

Energy basics

Energy • It is the ability to do work or to make things happen.

Force • It is the effect that changes energy into work done.

Work • It is the exerted force applied on an object causing motion.

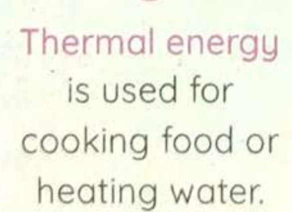
Relationship between Energy and Work



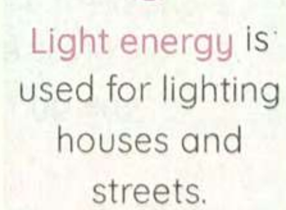
- The boy needs energy to move the box.
- The boy exerts a pushing force on the box.
- When the box moves, there is a work done.

Importance of Energy for Us

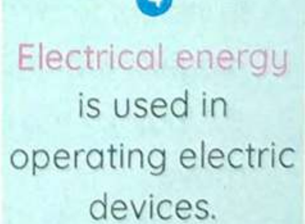
1. Our bodies store chemical energy that we get from food.



2. Thermal energy is used for cooking food or heating water.



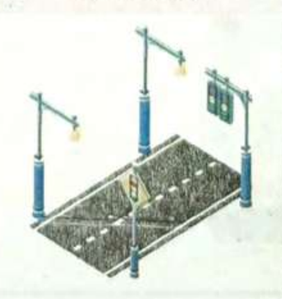
3. Light energy is used for lighting houses and streets.

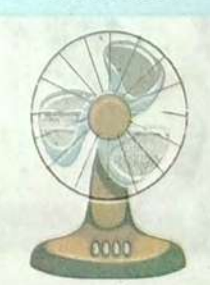


4. Electrical energy is used in operating electric devices.

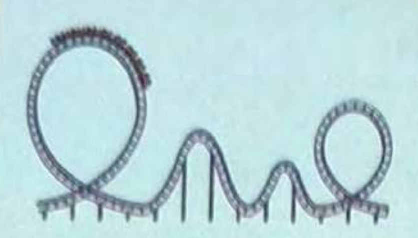




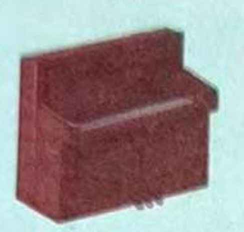




Properties of Energy



1. Energy can be stored and changed from one form to another, such as in roller coasters.



2. Most forms of energy can't be seen, such as sound, thermal, chemical and electrical energies.



3. The work done by energy can be seen and measured, such as: when the goal net vibrates when it gains kinetic energy.

Moving Energy

Example: When a football player kicks the ball:

1. Kinetic energy transfers from the **player's foot** to the **ball**, so the ball moves.



2. The ball moves in the air because it gains **kinetic energy**.



3. The goal net vibrates as kinetic energy transfers from the **ball** to the **goal net**.



Roller Coaster

At the beginning		• Electricity and motors carry the cars up to the top of the ramp.
During moving upward		• The stored potential energy increases gradually.
At the highest point (On the ramp)		• The stored potential energy becomes maximum.
During sliding down		• The stored potential energy is converted into kinetic energy. • As we move down: the speed and kinetic energy increase.



Scientists classify energy into two types

Potential Energy

• It is the energy stored in an object due to its position.

Example:

When you raise the ball.

Kinetic Energy

• It is the energy that an object has due to its motion.

Example:

When you leave the ball to fall.

Potential energy depends on:

1 The height of the body.

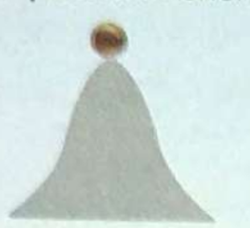
2 The mass of the body.

Kinetic energy depends on:

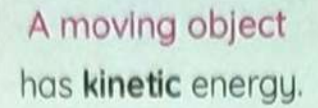
1 The speed of the body.

2 The mass of the body.

A static object at a height stores **potential** energy.



A moving object has **kinetic** energy.





A static object on the ground has **no** energy.

All forms of energy are classified into potential or kinetic energies.

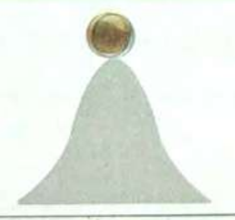
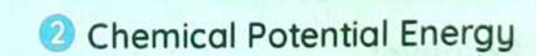
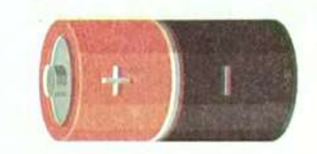


Forms of kinetic energy

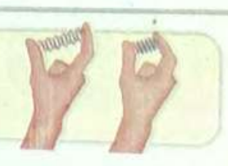
1 Sound Energy	2 Light Energy	3 Electrical Energy	4 Heat Energy
Movement of sound waves in the air	Movement of light waves in the air	Movement of electricity through the wires	Vibration of water particles during boiling



Forms of potential energy

1 Gravitational Potential Energy	2 Chemical Potential Energy
	 
A ball at the top of a hill stores gravitational potential energy.	A battery stores chemical potential energy.

A spring stores potential energy in it.



Energy Transformations

- Potential energy can be converted easily into kinetic energy.

Tool	Figure	Energy Used	Energy Produced
1 Flashlight (Torch)		Chemical energy (Stored in a battery)	Light energy Thermal energy
2 Gas oven		Chemical energy (Stored in natural gas)	Thermal energy
3 Spring toy car		Potential energy	Kinetic energy
4 Real Car		Chemical energy (Stored in gasoline)	Kinetic energy Thermal energy Sound energy
5 Spring		Potential energy	Kinetic energy
6 Food		Chemical energy (Stored in the food)	Kinetic energy

Unit 2 Concept 3

Energy and Collisions

Collision • It is the moment when two moving objects crash.

When two cars collide



- Energy transfer occurs.
- Energy change occurs.

The damage of collision depends on

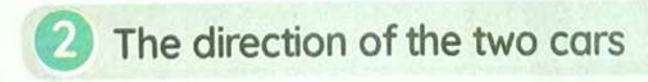
1 The speed of the two cars

Fast-moving Objects

- They have more energy.
- When they hit another object, they exert more force.
- This force causes a big damage that cannot be repaired.

Slow-moving Objects

- They have less energy.
- When they hit another object, they exert less force.
- This force causes a small damage that can be repaired.



2 The direction of the two cars

Same Direction

- The damage will be less severe.



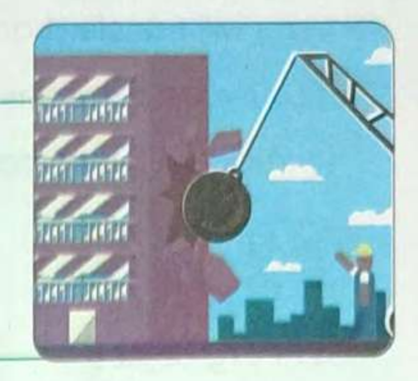
Opposite Direction

- The damage will be more severe.



Examples for Collision

Wrecking ball



- It's a very heavy steel ball swinging on a cable.
- It is used by construction workers to knock down walls or parts of buildings.

Cricket



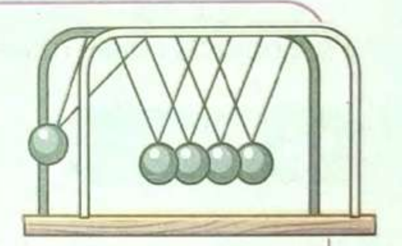
- The player uses a wooden bat to hit the ball.

When the player hits the ball:

- Kinetic energy transfers from the bat to the ball.
- The speed of the ball increases.
- The ball returns in a different direction.

- Collision always produces a popping sound.

Newton's cradle



When the ball is raised up:

- The ball stores potential energy and doesn't contain any kinetic energy.

When you leave the ball:

- Potential energy decreases gradually and is converted into kinetic energy.

When the ball hits the 1st other ball:

- Kinetic energy transfers from the 1st ball to the rest of the balls.
- Some of the kinetic energy is converted into sound and thermal energies.

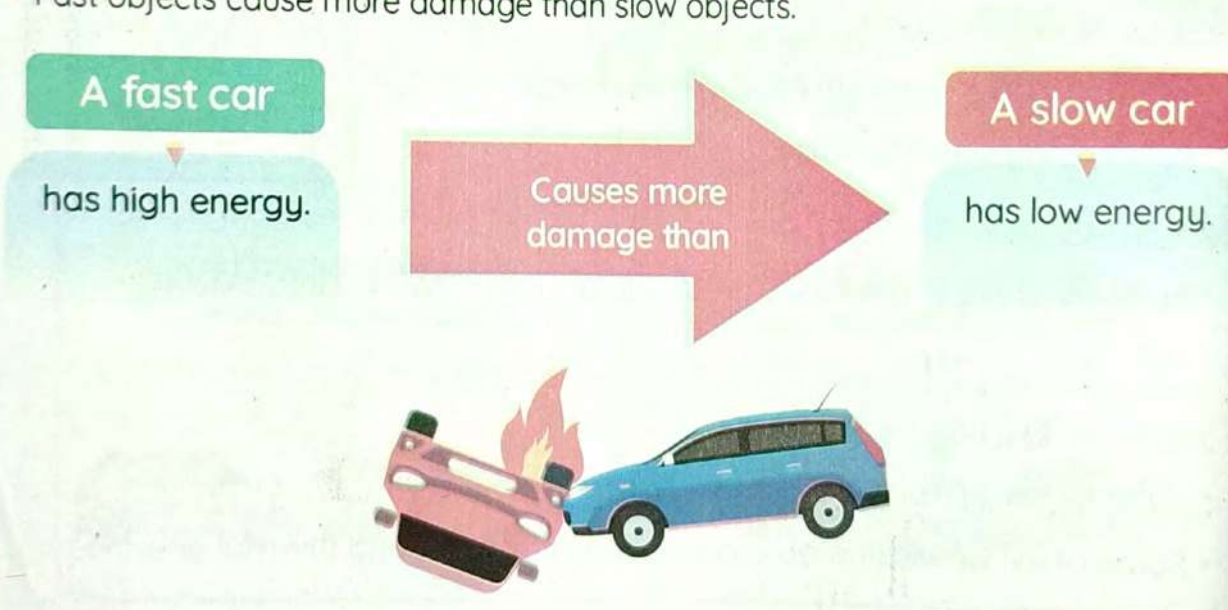
If a truck (more mass) hits a car (less mass):

- Energy will transfer from the truck (more mass) to the car (less mass).
  Because the truck has more energy than the car.
- The truck (heavy object) causes more damage than the car (light object).



If a fast car (higher speed) hits a slow car (lower speed):

- Energy will transfer from the fast car (higher speed) to the slow car (lower speed).
  Because the fast car has more energy than the slow car.
- Fast objects cause more damage than slow objects.



Safety Equipment During Collision

1 Seatbelt



It's used in cars to keep the driver and the passengers from moving forward during a collision (when the car stops suddenly).

2 Airbag

Structure

- It is made of a thin nylon material and is folded into the steering wheel, dashboards, seats or doors.

Idea

During collision:

- The airbag inflates automatically because the sensors of the car detect a crash.

After collision:

- The airbag deflates as fast as it inflates because it has holes and vents so that the driver can get out of the car.
- The sensors tell the airbag to inflate and fill with gas to provide a soft cushion.

Importance

- It slows the speed of the driver or passenger when his/her body moves forward.
- It absorbs the energy of the car during collision.





Speed

- Speed is a physical measurement that indicates how fast objects move.
- It is the distance covered by a moving object in a unit of time.
- The direction of the moving object doesn't affect the speed.

How to Measure the Speed

1 You must know the distance covered by the object.	Meter or kilometer
2 You must know the time taken to cover this distance.	Second or hour
3 To find the speed, Speed = Distance ÷ Time	m/sec or km/hr

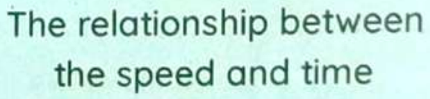
Problem:

- If Kenzy rides a bike and covers 150 m in 15 seconds to reach the supermarket, calculate the speed of the bike.



» Speed = $\frac{\text{Distance}}{\text{Time}}$ = $\frac{\dots}{\dots}$ = ... m/sec.

Comparing the Speed of One Body to Another

The relationship between the speed and distance (At the same time)	The relationship between the speed and time (At the same distance)
	  
The car has a higher speed. Because the car covers a longer distance in the same time.	The cheetah has a higher speed. Because the cheetah covers the same distance in a shorter time.

2 Definitions



Unit 1 Concept 1

Adaptations	They are characteristics that help living organisms to survive and reproduce in their ecosystem.
Habitat	It's the place (environment) where the living organism lives.
Structural adaptation	It's a change that happens in the structure of the organism's body.
Behavioral adaptation	It's a change that happens in the behavior of an organism.
Camouflage	It's a type of adaptation that animals use to hide from predators or to sneak up on the prey.
Countershading	It's a camouflage strategy in which the bull shark has a dark back and a white belly.
Migration	It's a behavioral adaptation where some birds travel for long distances at a certain time of the year.
Predator	It's an animal that hunts or eats another animal.
Prey	It's an animal that is hunted or eaten by another animal.
Blood vessels	They weave around each other in a penguin's feet.
Penguin	It's a non-flying bird that has a thick fat layer and dense feathers on its body.
Camel	It's an animal that stores fats in its hump to adapt to the desert environment.
Caracal	It's a cat with tan-colored fur that lives in the desert habitat.
Polar bear	It's a bear that has white thick fur and lives in polar regions.
Black (brown) bear	It's a bear that has dark fur and lives in forests.
Fennec fox	It's a fox that has tan (brown) fur and lives in deserts.

Arctic fox	It's a fox that has white fur in winter and brown fur in summer and lives in tundra.
Bull shark	It's an organism that uses countershading strategy to hunt.
Agama lizard	It's a lizard with colorful scales that adapted to live in the desert.
Panther chameleon	It's a lizard that can change the color of its scales and adapted to live in tropical rainforests.
Amazon rainforest	It is a rainforest that is characterized by strong wind and soggy soil.
Savannah	It is a grassland habitat that has drought conditions.
Kapok tree	It is a terrific tree that grows in Amazon rainforests in Brazil.
Acacia tree	It is a terrific tree that adapted to survive in drought environment in savannah grasslands.
Taproot roots	They're very long roots that grow directly downward in acacia trees.
Buttress roots	They're wide and large roots that fix kapok trees firmly to the soggy soil.
Pine tree	It's a tree that adapted to survive in snow and has a triangular shape.
Water lily	It's a tree that has wide leaves floating on water to absorb sunlight.
Mangrove tree	It's a tree that grows in a salt water and has a strong, long root.
System	It's a group of organs that work together to perform a job (function).
Digestion	It's the process of breaking down food into the simplest form to provide the body with nutrients.
Digestive system	It's the body system that breaks down food into tiny pieces, so the body cells can use them for energy.
Mouth	It's the organ where the digestion of food starts.

Teeth	It's the structure that crush (break) the food during chewing.
Tongue	It's a structure inside the mouth that mixes the crushed food with saliva.
Saliva	It's a liquid substance inside the mouth that moistens food.
Pharynx	- It's an organ that exists in both the digestive and respiratory systems. - It's a common passage for both food and air. - It's an organ that pushes the food into the esophagus. - It's an organ that pushes air into the trachea.
Esophagus	It's a long muscular tube that moves the food down into the stomach.
Stomach	It's a muscular organ that mixes the food with acidic and digestive juices (enzymes) until the food becomes a soupy liquid.
Small intestine	It's an organ where nutrients from the food are absorbed through its walls.
Large intestine	It's an organ that absorbs water from the undigested food to become solid waste.
Anus	The solid waste leaves the body through it.
Respiratory system	It is the system responsible for breathing (respiration).
Respiration	It's the process of inhalation "pulling the air in" and exhalation "pushing the air out".
Inhalation	It's the process of pulling the air in the body.
Exhalation	It's the process of pushing the air out of the body.
Nose	It is the first organ of the respiratory system through which air enters the body.
Trachea	It allows air to pass to the two lungs and it is divided into two bronchi at its end.

Two bronchi	They allow air to enter the two lungs and they are divided into smaller tubes that look like tree's branches called bronchioles.
Two lungs	They have two balloon shapes and they are responsible for gas exchange through a structure called the alveoli.
Alveoli	There are tiny air sacs surrounded by blood vessels where oxygen is transferred through them to the blood stream.
Diaphragm	It's a large muscle that has an important role during inhalation and exhalation.
Oxygen	It's the gas needed for respiration for all living organisms.
Carbon dioxide	It's the gas expelled out of the body during respiration.
Gills	They're unique structures that allow fish to extract oxygen from water.
Air pollution (smog)	It's a type of pollution that makes it hard for humans to breathe.
Water pollution	It's a type of pollution that makes it hard for humans to find clean drinking water.
Soil pollution	It's a type of pollution that makes the crops not grow.
Amphibians	They're living organisms that live in moist (wet) environments as they can live on land or in water.
Skin	It's a structure that allows amphibians to extract oxygen from water.
Endangered species	They're the species that have a great loss in the numbers of their members.
Extinction	It occurs when all members of one species die.

Unit 1 Concept 2

Nocturnal animals	They are animals that adapted to be active at night.
Echolocation	It's a property used by dolphins and bats to locate the prey in the dark.
Echo	It's the reflection of sound waves back from a solid surface to the sound source.
Egyptian mongooses	They're animals that communicate by producing sounds that seem like chatter.
Dolphin	It's a fish that use echolocation property to hunt in the dark wate
Owl	It's a bird that has a bowl-shaped face with feathers.
Nervous system	- It's the system that allows us to sense our surrounding environment. - It's the system that keeps the living organisms safe away from danger.
Brain	- It's the main control center in the human body. - It's the organ that translates information and gives a suitable respond.
Spinal cord	It's a big nerve that passes through the backbone and is connected to the brain.
Nerves	- They're branches extended all over the body parts that carry messages. - They connect the components of the nervous system together
Sensory receptors	They're nerves found in the sensory organs and receive information from the surrounding environment.
Jerboa	It's a desert rodent that has very large ears and long hind legs
Reaction time	It's the time taken by a living organism to respond to danger
Reflex actions	They're messages that are transmitted so fast that you are barely aware of them.
Human	A living organism that communicate by writing, speaking and reading.

Humpback whales	They're living organisms that sing a wide range of musical tones to communicate.
Ants	They communicate together using their sense of smell.
Nurse ants	They're ants that send strong smelly messages to scout ants if the food is low.
Scout ants	They're ants that search for food and locate it.
Solider ants	They're ants that protect the colony from any nearby danger.
A blind person's cane	It's a special device used by a blind person to locate things nearby.
Hearing sense	It's the sense used by bats to detect echo.
Touch sense	It's the sense used by a blind person to detect echo.
Smell sense	It's the sense used by ants to communicate.

Unit 1 Concept 3

Light	It's the visible form of energy that is necessary for vision.
Light source	It's the object that emits its own light.
Moon	It's a shiny object in the sky that reflects the sunlight falling on it.
Eye	It's the organ that is affected by light and is responsible for eye sight.
Night vision goggles	It's a device used by humans and they work as the eyes of fishing cats at night.
Eye pupil	It's a structure inside the eye that controls the amount of light that enters the eye.
Fishing cat	It's a wild cat that has eyes that glow at night.
Transparent materials	They are materials that allow light to pass through.
Opaque materials	They are materials that don't allow light to pass through.

Term	Definition
Smooth materials	They are materials that reflect the light rays in one direction.
Rough materials	They are materials that diffuse the light rays in different directions.
Light reflection	It is the bouncing of light rays when it falls on a reflecting surface.
Shadow	It's a dark area that is formed when light falls on an opaque object.
Fireflies	It's a kind of beetles that light up their wings to communicate.
Code	It is a pattern that has a meaning.
Language	It's a code in the form of sounds.
Writing	It's a code in the form of symbols or arranged letters.

Unit 2 Concept 1

Term	Definition
Static object	It's the object that doesn't change its position.
Moving object	It's the object that changes its position.
Shockwave truck	It's the fastest truck in the world.
Parachute	It's a tool used to decrease the speed of the Shockwave truck.
Force	It's a push or pull that is applied on an object to move it.
Motion	It's the change of the position of an object relative to a fixed point.
Gravity	It's the force that pulls objects towards the Earth's center.
Pushing force	It's the force used to move an object away from you.
Pulling force	It's the force used to move an object towards you.
Friction	- It's the force that arises when two objects rub against each other. - It's the force that slows down a moving object until it stops.
Energy	It's the ability to do work or to make things happen.
Work	It is the energy needed to move an object by applying a force on it.

Unit 2 Concept 2

Potential energy	It's the energy stored in an object due to its position.
Kinetic energy	It's the energy gained by an object due to its motion.
Motor	It's a device that changes electrical energy into kinetic energy.
Chemical energy	It's the energy stored in the food we eat.

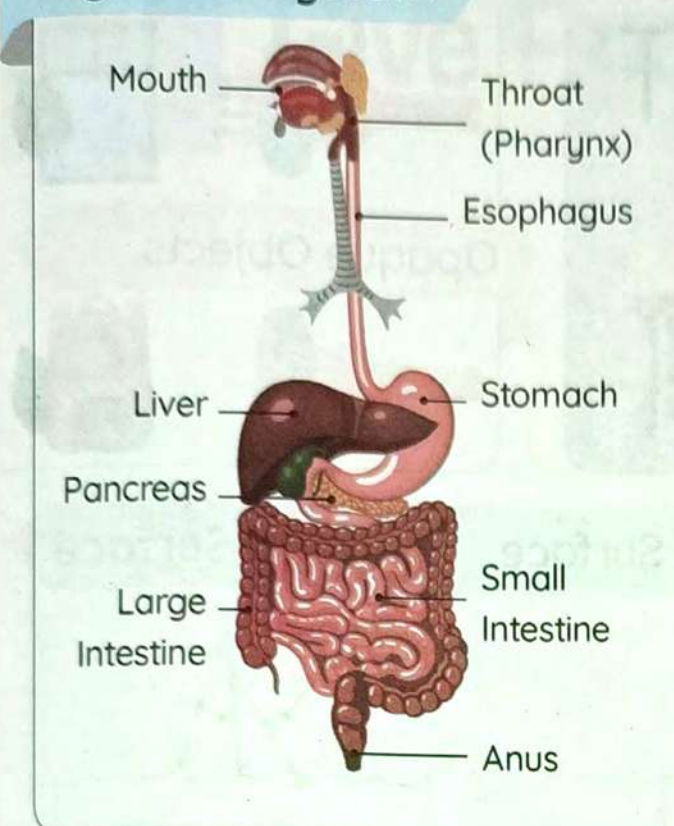
Unit 2 Concept 3

Collision	It's the moment when two moving objects crash.
Wrecking ball	It's a heavy steel ball swinging on a cable that is used by builders to knock down buildings.
Cricket	It's a popular game in which a player hits the ball with a wooden bat.
Seatbelt	It's a safety equipment that keeps the driver's body from moving forward during a collision.
Airbag	- It's a safety equipment that slows the speed of the driver from moving forward. - It's a safety equipment that absorbs the energy of the car during a collision.
Sensors	They tell the airbag to inflate and fill with gas to provide a soft cushion.
Speed	It is the distance traveled per a unit of time. It's a measurement of how objects move fast or slow.

3 Important Drawings



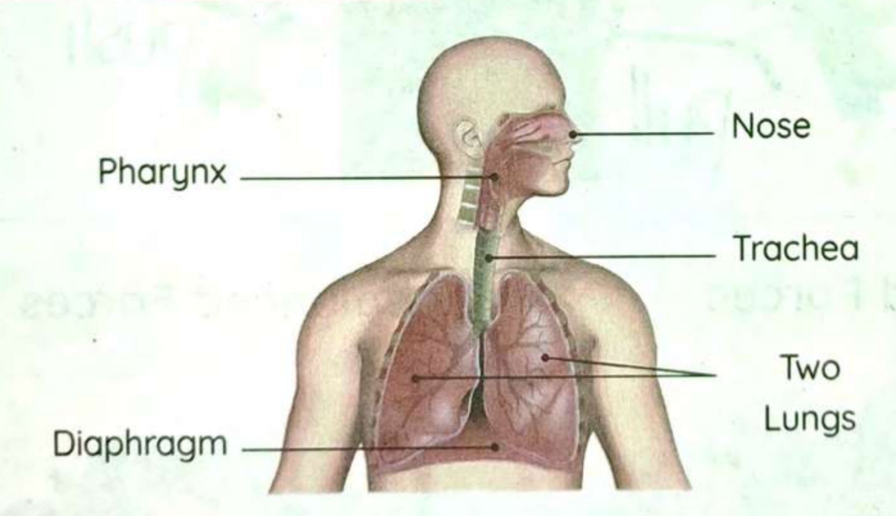
Digestive System

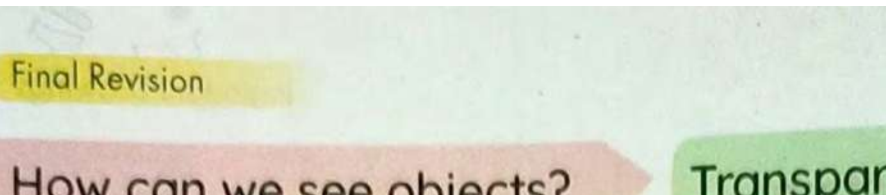


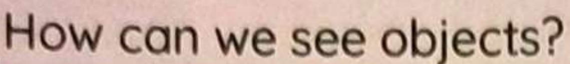
Nervous System



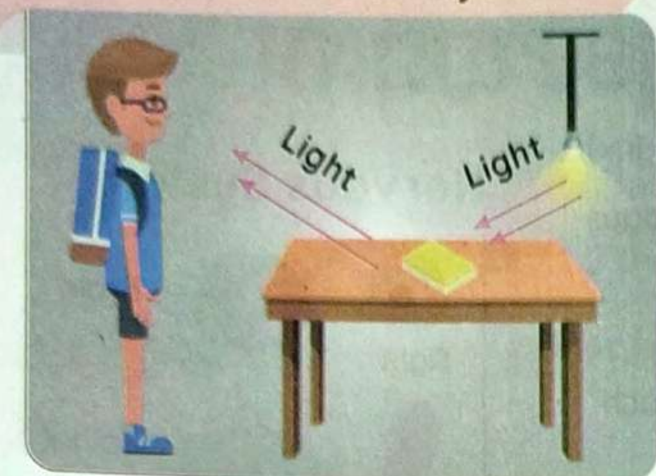
Respiratory System



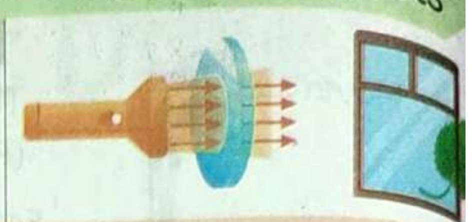




How can we see objects?



Transparent Objects

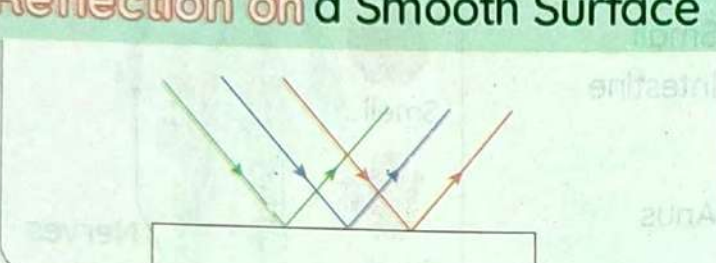


Opaque Objects

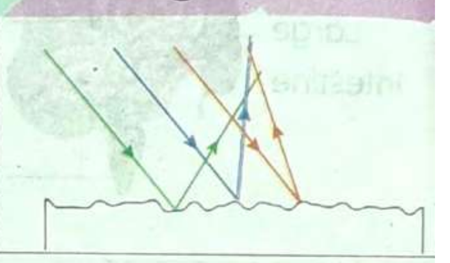




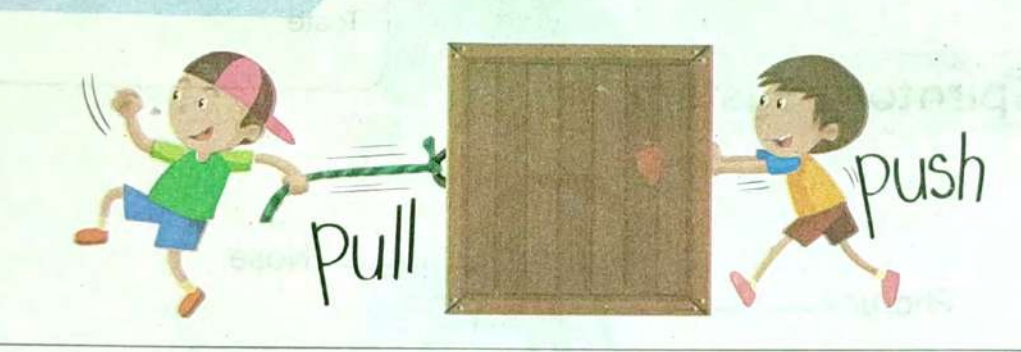
Reflection on a Smooth Surface



Rough Surface

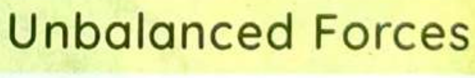


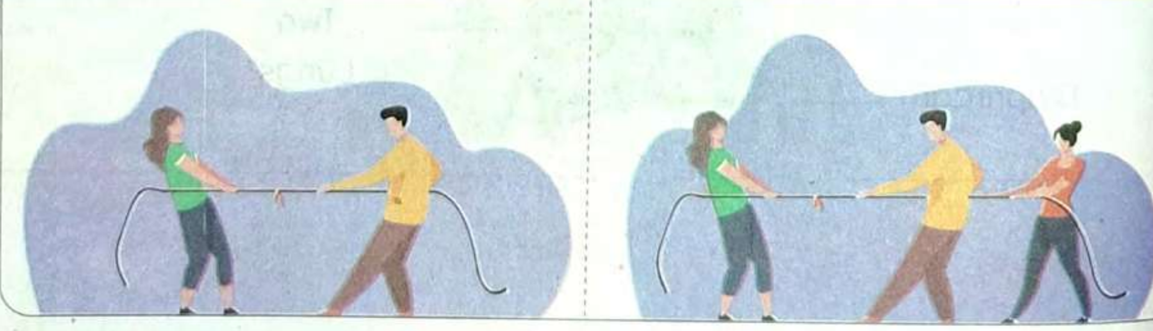
Push and Pull



Balanced Forces

Unbalanced Forces





4 Give Reasons For...



Unit 1 Concept 1

1. A camel stores fats in its hump.
   - To adapt to the dry and hot desert environment.
2. The starred agama lizard is always looking for shaded areas in the desert.
   - To keep its body cool during hot, sunny days.
3. The penguin's body has a thick layer of fat and dense feathers.
   - To keep its body warm in the extreme cold weather.
4. The blood vessels in the penguin's feet weave around each other.
   - To keep its toes from freezing as the warm blood vessels heat up the cold blood vessels.
5. Some desert lizards have colorful scales.
   - To hide among the colorful rocks in the desert.
6. A fennec fox has brown, tan-colored fur.
   - To hide and blend in with the desert environment.
7. A polar bear has white fur.
   - To hide and blend in with the snow.
8. A polar bear has thick, heavy fur.
   - To keep its body warm in the cold weather.
9. Brown bears and black bears have dark fur.
   - To hide among the trees in the forest.
10. Some animals have the ability to use camouflage strategy.
    - To hide from their predators or to sneak up on the prey.
11. An Arctic fox has short ears and legs.
    - To stay warm in the cold weather.
12. A fennec fox has extra-large ears.
    - To lose heat and cool its body.
13. A fennec fox undergoes panting.
    - To cool its body.
14. An Arctic fox has thick fur (coat).
    - To keep its body warm in extreme cold weather.
15. The fur of the Arctic fox is white in winter and brown in summer.
    - To sneak up on its prey in any season.
16. Fennec foxes hide in burrows during day time.
    - To stay cool during hot, sunny days in the desert.
17. Arctic foxes hide in burrows at night.
    - To stay warm at cold nights.

18 Both fennec foxes and Arctic foxes eat different kinds of food.
- Because it is hard to find food in the hot desert or the tundra desert.

19 Bull sharks have less competition for finding food in fresh water.
- Because other types of sharks live in salt water only.

20 Bull sharks use a camouflage strategy called countershading in hunting.
- To sneak up on its prey during hunting.

21 The eyes of a panther chameleon move independently (in different directions).
- Because the panther chameleon uses one eye to find food and the other eye to avoid danger.

22 A panther chameleon has V-shaped feet and a long tail with a hand shape.
- To hold the branches of trees tightly.

23 Acacia trees have very long roots that grow downward (taproot roots).
- To get water from the deep soil.

24 The branches of acacia trees gather on the top of its trunk.
- To prevent animals from reaching their leaves.

25 Acacia trees have sharp spines around their leaves.
- To prevent animals from eating their leaves.

26 Acacia trees use wind to communicate with other trees.
- To send smelly messages to nearby acacia trees to produce poison if there is danger nearby.

27 A kapok tree has large wide roots that grow up around the trunk (buttress roots).
- To fix the tree firmly in the soggy soil.

28 A kapok tree has hand-shaped leaves.
- To allow wind to move gently through its leaves without cutting them.

29 A pine tree has a triangular shape and short branches.
- To allow the snow to slide on it without breaking its branches.

30 Water lilies have wide floating leaves.
- To absorb a large amount of sunlight.

31 Mangrove trees have long and strong roots.
- To resist the water waves.

32 Palm trees have thick roots and small leaves.
- To resist the strong winds.

33 Barbary figs have sharp spines.
- To prevent animals from eating their fruits and leaves.

34 The human body is made up of different systems.
- To perform different functions.

35 The human body needs energy.
- To survive, grow and carry out vital processes.

36 The teeth plays an important role in digestion.
- Because teeth break down food into smaller pieces.

37 The tongue plays an important role in digestion.
- Because the tongue mixes the broken food with saliva.

38 Saliva plays an important role in swallowing food.
- Because saliva moistens the food to facilitate its swallowing.

39 The juices of the liver and pancreas are important.
- To help in breaking down the food into nutrients.

40 The small intestine is an important organ in the digestive system.
- Because the nutrients are absorbed by the walls of the small intestine.

41 The large intestine is an important organ in the digestive system.
- Because it absorbs water from the undigested food and turns it to solid waste.

42 The anus is an important organ in the digestive system.
- Because solid waste can leave the body through it.

43 Alveoli are important for the respiratory system.
- Because they are responsible for the gas exchange.

44 The inhaled air differs from the exhaled air.
- Because the inhaled air is rich in oxygen gas, while the exhaled air is rich in carbon dioxide gas.

45 The diaphragm plays an important role in the respiration process.
- Because during inhalation, the diaphragm contracts and moves downward to increase the chest size, while during exhalation, the diaphragm relaxes and moves upward to decrease the chest size.

46 Gills are unique structural adaptations in fish.
- Because they enable fish to breathe underwater.

47 Cars and factories exhausts have bad effects on the environment.
- Because they produce smog which causes damage to the lungs, asthma, and difficulty in breathing.

48 Frogs can live in water.
- Because frogs' skin can absorb oxygen gas from the water.

49 The dry season is very harmful for amphibians.
- Because their skin must be wet all the time to extract oxygen gas from the water.

50 Pollution of air and water can affect the survival of amphibians.
- Because they breathe oxygen gas from water and air.

51 Scientists must study how amphibians interact with their environments.
- To help them survive and protect them from extinction.



1. Some animals are adapted to be active at night.
   - These animals may live in an extreme hot habitat, so they prefer to hunt at night when the weather becomes cooler.
   - Some prey are available at night only.
   - Some animals depend on the complete darkness to surprise their prey.
2. The Egyptian mongoose makes sounds.
   - To communicate with other mongooses to move to another place to search for food.
3. Owls can hunt during the night.
   - Because they have extraordinary senses of hearing and sight.
4. Dogs can recognize their friends.
   - Because they have sharp senses of hearing and smell.
5. Dolphins use echolocation property that depends on echo.
   - To locate their prey in the dark water.
6. Owls can rotate (turn) their heads in all directions.
   - To search for the prey everywhere.
7. Owls have bowl-shaped faces.
   - To pick up distant sounds and amplify them.
8. Owls have large eyes.
   - To see the tiny and far-away movements of the prey.
9. The brain has an important function in the nervous system.
   - Because it is the main control center of the body that translates messages received from the environment and gives the muscles the suitable response.
10. Nerves have an important function in the nervous system.
    - Because they carry messages through the human body.
11. The Egyptian jerboa can jump for long distances.
    - Because it has long, hind legs to jump for long distances.
12. The presence of hair on the Egyptian jerboa's feet and toes.
    - To help it grip the sand during jumping in zigzag paths.
13. The Egyptian jerboa has large and sensitive ears.
    - To detect even the quiet noise of a snake.

14 The Humpback whales sing different songs.
- To communicate with each other in different seasons.

15 The nurse ants send smelly messages to scout ants.
- To alert the scout ants that the food is low.

16 The soldier ants use smells in their communication.
- To communicate with the other ants if there is a danger nearby.

17 The echo that is picked up by the special cane of blind people is turned into vibrations.
- To help the blind person to detect his surroundings using his touch sense.

18 Blind people cannot hear the sound emitted from their special canes.
- Because their special canes emit a high-pitched sound that humans' ears cannot hear.

Unit 1 Concept 3

1 The fishing cat's eyes seem to glow in the dark.
- Because it has a mirror-like membrane on the back of its eyes which reflects the light rays that fall on it.

2 A candle is considered a source of light.
- Because it emits its own light.

3 The moon seems shiny, but it is not considered a source of light.
- Because the moon acts as a mirror that reflects the sunlight falling on it.

4 Nocturnal animals can see better than humans at night.
- Because nocturnal animals have bigger eyes and their pupils open wider than human.

5 The shadow of an opaque body is formed when light falls on it.
- Because the opaque body does not allow light to pass through.

6 You can see an object placed behind a glass window.
- Because glass is a transparent material that allows light to pass through.

7 Fireflies use different patterns of flashlight to communicate with each other.
- To warn off their predators or to attract a mate.

8 Fireflies produce a chemical reaction inside their bodies.
- To light up their bodies and communicate with each other.

Unit 2 Concept 1

1. A jet airplane is faster than a normal truck.
   - Because a jet airplane has a more powerful engine than a normal truck.
2. The Shockwave truck is faster than the normal truck.
   - Because it is fitted with three jet engines.
3. Engineers installed three parachutes in the Shockwave truck designs.
   - To help the driver decrease the speed of the Shockwave truck quickly.
4. The static ball on the ground moves when you kick it.
   - Due to the pushing force of your leg on it.
5. When two equal pushing forces act on an object in opposite directions, the object does not move.
   - Because the forces that affect the object are balanced, so the object doesn't move.
6. When you throw the ball up, it returns to the ground.
   - Due to the gravity that pulls the ball down towards the Earth's center.
7. When a car crashes into a wall, it will stop moving.
   - Because the wall applied a force to the car that is equal to the force of the moving car, but in the opposite direction.
8. When you stop pedaling during the movement of your bicycle, it slows down until it stops.
   - Due to the friction force between the bicycle tires and the road.

Unit 2 Concept 2

1. The roller coaster doesn't need electricity during sliding down.
   - Because the stored potential energy changes to kinetic energy.
2. The speed of the roller coaster increases as it moves down the hill.
   - Because its kinetic energy increases.
3. The goal net vibrates when a ball hits it.
   - Because the kinetic energy of the ball transfers to the goal net.

4 The book on the table has energy.
- Because the book on the table stores potential energy.

5 When a ball is thrown upwards, its potential energy increases.
- Because its height from the Earth increases.

6 An electric lamp produces different forms of energy.
- Because it produces light and thermal energies.

7 On lifting the toy car operated by a spring, the car moves.
- Because the potential energy in the spring changes to kinetic energy.

Unit 2 Concept 3

1 The speed of the ball increases when the bat hits it hard.
- Because the kinetic energy of the bat transfers to the ball.

2 Seatbelts in cars are very important.
- Because they keep the drivers' and passengers' bodies from moving forward when the car stops suddenly.

3 Airbags in cars are very important.
- Because they slow down the speed of the driver or the passenger while moving forward and absorb the energy of the car during a collision.

4 When two objects collide, you can hear a sound.
- Because a part of the kinetic energy changes into sound energy.

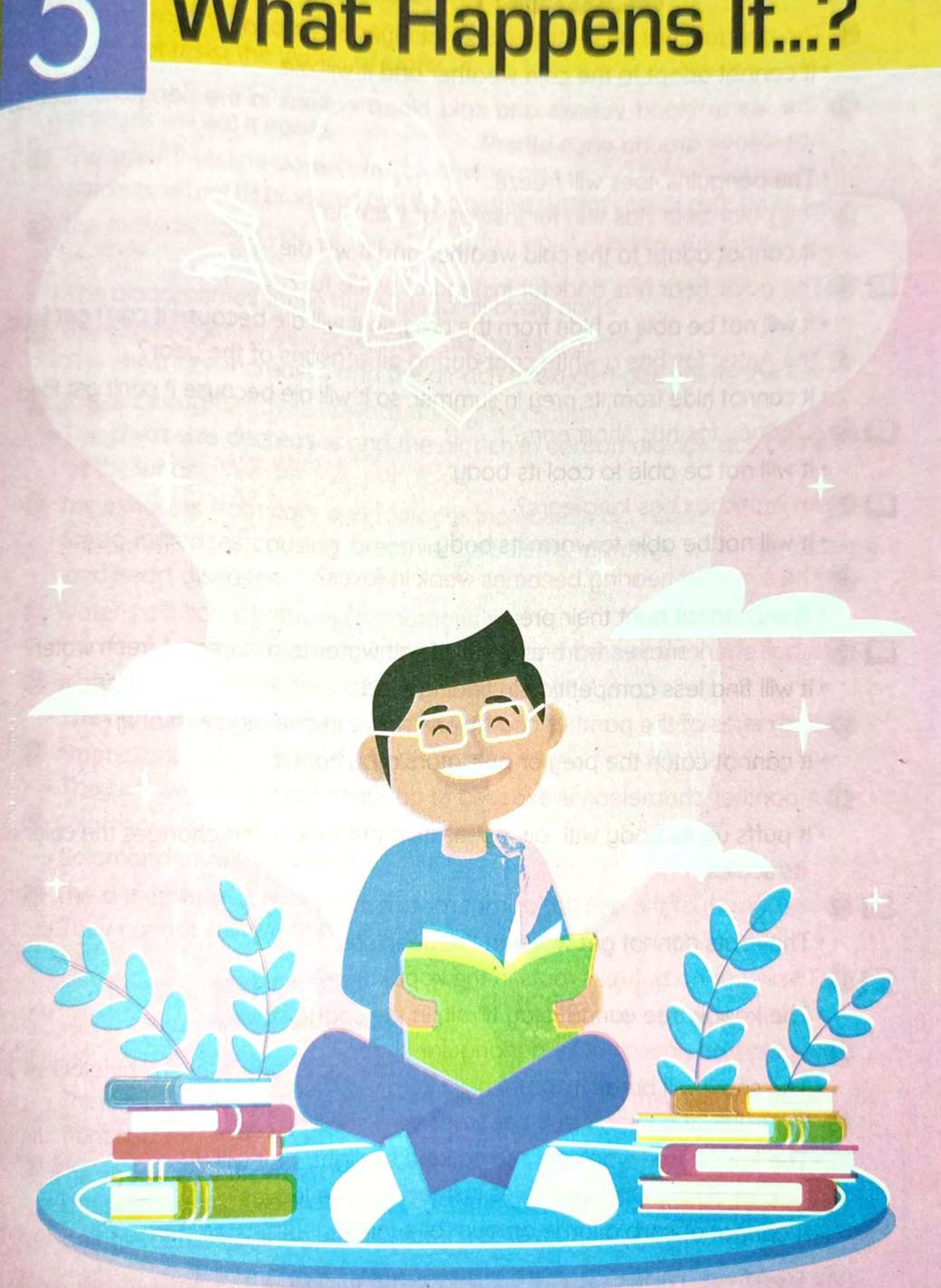
5 Driving fast is very dangerous.
- Because increasing the speed will increase the kinetic energy that results in exerting more force during a collision.

6 A truck needs a bigger engine than that of a small car to move.
- Because the truck has more mass than the car.

7 A truck consumes more fuel than that consumed by a small car.
- Because the truck has a bigger engine than the car.

8 A moving truck has more kinetic energy than a small moving car at the same speed.
- Because the truck has a bigger mass than the small car.

5 What Happens If...?



Unit 1 Concept 1

1. The penguin has no feather or no fat layer on its body?
   - It cannot adapt to the cold weather and it will die.
2. The warm blood vessels and cold blood vessels in the penguins' feet do not weave around each other?
   - The penguins' toes will freeze.
3. The polar bear has thin fur instead of thick fur?
   - It cannot adapt to the cold weather and it will die.
4. The polar bear has dark fur instead of white fur?
   - It will not be able to hide from the prey, so it will die because it can't get food.
5. The Arctic fox has a white coat during all seasons of the year?
   - It cannot hide from its prey in summer, so it will die because it can't get food.
6. A fennec fox has short ears?
   - It will not be able to cool its body.
7. An Arctic fox has long ears?
   - It will not be able to warm its body.
8. The sense of hearing becomes weak in foxes?
   - They cannot hunt their prey.
9. A bull shark moves from an area of salt water to an area of fresh water?
   - It will find less competition in finding food.
10. Both eyes of the panther chameleon move in one direction only?
    - It cannot catch the prey or predators may hunt it.
11. A panther chameleon is exposed to danger?
    - It puffs up its body with air, opens its mouth wide and changes the color of its scales.
12. The length of the acacia taproot roots is short?
    - The roots cannot get water in the deep soil.
13. There are no buttress roots in the kapok tree?
    - The kapok tree cannot stay firmly in the soggy soil.
14. A pine tree doesn't have a triangular shape?
    - The snow will break its branches.
15. The trunk of a kapok tree becomes very short?
    - The kapok tree won't get the needed sunlight, so it will die.
16. A water lily has narrow leaves instead of wide leaves?
    - It cannot absorb a large amount of sunlight.

17 A palm tree has thin roots and large leaves?
- It cannot resist the strong winds.

18 A mangrove tree has short and weak roots?
- It cannot resist the waves of water.

19 A barbary fig has no spines?
- Animals will eat it easily.

20 The small intestine doesn't exist in the human body?
- Nutrients will not be produced and the digestive system cannot perform its function.

21 The nutrients absorbed by the walls of the small intestine enter the tiny blood vessels?
- The blood carries these nutrients to all body parts.

22 The diaphragm moves downward during inhalation?
- The chest size increases and the air rich in oxygen gas enters the lungs.

23 The diaphragm moves upward during exhalation?
- The chest size decreases and the air rich in carbon dioxide gas comes out of the lungs.

24 The exhausts from cars and factories increase in big cities?
- Smog increases causing breathing problems, damage of lungs, asthma, and heart diseases.

25 Water pollution increases (for humans and fish)?
- Humans cannot find clean water to drink, and fish will die.

26 Water pollution increases in the natural habitat of amphibians?
- The number of amphibians will decrease.

27 Amphibians do not have lungs and breathe only through their skin?
- They will live only underwater.

28 Salamenders have lungs only to respire?
- Salamanders will live on land only.

29 The skin of frogs becomes dry?
- They cannot survive and they will die.

Unit 1 Concept 2

1 Dolphins have a weak sense of hearing?
- They cannot detect echo reflected from the prey, so they will not be able to hunt in dark water.

2 The sound waves produced by a dolphin hit an object underwater?
- The sound waves will bounce back to the dolphin in the form of echo, so the dolphin can detect the location of the object.

3. Bats have a weak sense of hearing?
   - They cannot detect the echo reflected from the prey, so they won't be able to hun
4. Owls cannot turn their heads in all directions?
   - They cannot search for the prey everywhere.
5. Your hand touches the spines of a cactus plant?
   - Your hand will move away quickly.
6. The Egyptian jerboa hears a snake moving towards it?
   - It will hop in a zigzag path to escape quickly.
7. The hearing sense of humpback whales becomes weak?
   - They cannot communicate by songs using their hearing sense.
8. The smell sense of ants becomes weak?
   - They cannot communicate with each other.
9. The amount of food in the ant's colony becomes low (decreases)?
   - The nurse ants will send a smelly message to the scout ants to alert them.
10. There is a danger near an ant's colony?
    - The solider ants will send smelly messages to alert the other ants.
11. The high-pitched sound that is produced by the blind person's cane hits an object?
    - It bounces back to the cane in the form of echo which is turned into vibrations.

Unit 1 Concept 3

1. The fishing cats' eyes doesn't have a mirror-like membrane?
   - Fishing cats will not see well at night.
2. The moon cannot reflect light?
   - It appears dark and we cannot see it.
3. Light falls on a transparent object, such as a glass window?
   - Light will pass through the glass window.
4. Light falls on an opaque object, such as a human body?
   - Light will not pass through it and a shadow will be formed.
5. Light falls on a smooth surface (mirror)?
   - Light rays are reflected in the same direction.
6. Light falls on a rough surface (wood)?
   - Light rays are diffused in different directions.
7. A firefly wants to attract a mate?
   - It produces a chemical reaction inside its body to light up.

8. Another group of fireflies flashes nearby?
   - They will stop flashing their own pattern and start to match the pattern of the other fireflies.
9. The traffic light becomes red while you are driving the car?
   - The eyes send a message to the brain, then the brain alerts you to stop moving.



Unit 2 Concept 1

1. You kick a static ball on the ground?
   - The ball will move due to the pushing force of your leg.
2. Engineers placed jet engines inside a normal truck instead of its normal engine?
   - It would move much faster.
3. The Shockwave driver opens the parachutes?
   - The Shockwave will slow down gradually until it stops.
4. The pulling force of the two teams are equal in the tug-of-war game?
   - The rope will not move.
5. The pulling force of the two teams are unbalanced in the tug-of-war game?
   - The rope will move towards the greater force.
6. You let your book out of your hand?
   - The book will fall down due to the pulling force of gravity.
7. You push two similar toy cars with different forces on the ground?
   - The ball that is affected with a greater force will move a longer distance.



Unit 2 Concept 2

1. A roller coaster moves up the ramp?
   - The stored potential energy will increase.
2. A roller coaster moves down the ramp (according to the change in energy)?
   - Its stored potential energy changes into kinetic energy.
3. An apple falls from a tree to the ground (according to the change in energy)?
   - The potential energy of the apple changes into kinetic energy.
4. You transfer a book from a lower shelf to a higher shelf (according to the potential energy)?
   - The stored potential energy will increase.
5. You operate a washing machine (according to the change of energy)?
   - The electrical energy changes into kinetic and sound energies.
6. You switch on an electric lamp (according to the change of energy)?
   - The electrical energy changes into light and thermal energies.

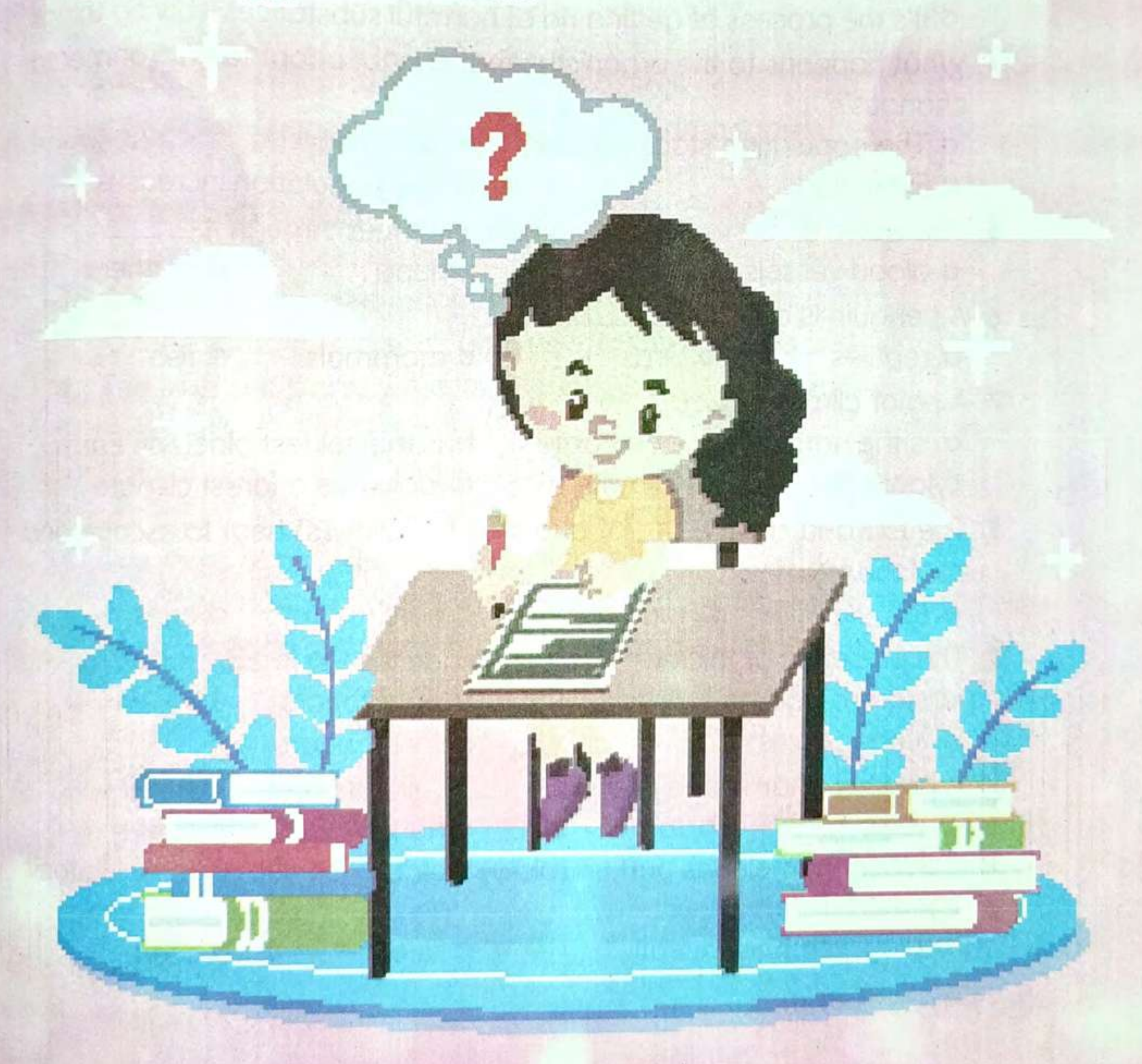
Unit 2 Concept 3

1. The moving bat hits a ball in cricket?
   - The kinetic energy of the bat transfers to the ball.
2. The airbags in a car don't inflate during a crash?
   - The driver will be pushed forward and get injured.
3. The speed of a car increases (according to the kinetic energy)?
   - The kinetic energy increases.
4. Two cars moving in opposite directions collide?
   - The damage will be more severe.
5. Two cars moving in the same direction collide?
   - The damage will be less severe.
6. A bike moving fast hits a person?
   - The person may get injured only and survive.
7. A car moving fast hits a person?
   - The person's life may be in danger.
8. The pushing force acting on an object increases (according to the kinetic energy)?
   - The kinetic energy will increase.
9. The kinetic energy of a moving car increases (according to the damage of collision)?
   - The damage will be more severe.
10. A truck and a small car move at the same speed (according to the kinetic energy)?
    - The kinetic energy of the truck will be greater than that of the car.
11. You increase the angle of inclination of a ramp where a ball is moving down it (according to the speed of the ball)?
    - The speed of the ball will increase.
12. Newton's cradle ball is raised up without leaving it (according to its energy)?
    - The ball will store potential energy.
13. You leave the ball of Newton's cradle move towards the rest of the balls (according to the change of energy)?
    - The potential energy changes into kinetic energy.
14. Friction occurs between the string and the other parts of Newton's cradle during collision (according to the change of energy)?
    - Some of the kinetic energy changes into thermal energy.

6 Final Revision

All questions in this final revision are derived from official sources, such as:

1. Final governments' exams in 2022 and 2023
2. Egyptian Knowledge Bank questions
3. MOE Egypt Edu Stream



Revision

Concept 1.1

Adaptation and Survival

1 Choose the correct answer:

1. ________ is one of the behavioral adaptations that help animals protect themselves from enemies.
   a. Camouflage b. Extinction c. Migration d. Reproduction
2. Adaptations include changes that ________ in the environment.
   a. reduce chances of survival b. reduce life span for individuals
   c. improve species survival d. reduce reproduction process
3. What is adaptation? ________ .
   a. It's the process by which new species appear.
   b. It's a property possessed by living things to help them survive.
   c. It's a form of pollination for trees.
   d. It's the process of getting rid of harmful substances in living things.
4. What happens to the organisms that cannot adapt to environmental changes?
   a. The population stays constant. b. Surviving
   c. Extinction d. The population increases.
5. The warm blood transfers to a penguin's feet through its ________ .
   a. blood vessels b. skin c. head d. feathers
6. A penguin is one of the ________ .
   a. reptiles b. birds c. mammals d. fish
7. A polar climate ________ .
   a. is the hottest place on Earth b. is the coldest place on Earth
   c. looks like a desert climate d. looks like a forest climate
8. The extra-large ________ of a fennec fox allow(s) heat to escape and cool the fox.
   a. fur b. face c. ears d. eyes
9. The presence of thick white fur is an adaptation in ________ .
   a. starred agama lizards b. polar bears
   c. fennec foxes d. forest bears
10. A panther chameleon uses its ________ like a hand.
    a. eyes b. tail c. head d. ears
11. Panther chameleons puff up (blow) their bodies with air to ________ their enemies.
    a. play with b. eat c. sleep d. scare

12 ________ cover(s) the body of Arctic foxes.
a. Heavy hair b. Thin fur c. Many feathers d. Thick fur

13 ________ pant to lower their bodies temperature.
a. Whales b. Foxes c. Penguins d. Bats

14 Animals that live in a hot environment have ________ ears to allow heat to escape and be cool.
a. small b. short c. long d. sharp

15 Which of the following is an example of camouflage?
a. A camel's broad feet b. A camel's hump
c. Powerful parrot wings d. A fox's brown fur

16 An eagle is a kind of bird that eats meat. Its beak is strong and sharp. This structural adaptation helps it to ________ .
a. rip meat b. see c. escape d. find a shelter

17 ________ can live in both fresh and salt water.
a. Polar Bears b. Bull Sharks c. Dolphins d. Penguins

18 ________ puff up (blow) their bodies with air to scare their enemies.
a. Bats b. Snakes
c. Panther chameleons d. Agama lizards

19 Bull sharks can live in ________ .
a. fresh water only b. seas and mud
c. rivers, seas, and oceans d. salt water only

20 One of the structural adaptations of water lily is that it has ________ .
a. long roots b. sharp spines c. tiny leaves d. wide leaves

21 The tree that stores water in its trunk is ________ tree.
a. kapok b. acacia c. pine d. water lily

22 Both of acacia trees and kapok trees have the same ________ .
a. habitat b. shape c. roots d. trunk

23 The roots of palm plants help them to ________ .
a. stand strong against the wind b. reach the underground water
c. stay steady in the soil d. all the previous answers

24 In the process of respiration (inhalation), ________ gas enters the lungs.
a. oxygen b. carbon dioxide c. nitrogen d. hydrogen

25 The food remains inside the human stomach for ________ .
a. many hours b. many days c. a few seconds d. a few minutes

26 Stomach is a part of the digestive system that ________ .
a. chews food b. converts solid food into liquid
c. absorbs nutrients from the food d. delivers food into the esophagus

27 Digestion of food starts in the ________ .
a. esophagus b. lungs c. mouth d. stomach

28 The long winding tube that is more than 6 meters long is called ________ .
a. small intestine b. esophagus c. large intestine d. stomach

29 All the following are components of the digestive system, except ________ .
a. lungs
b. stomach
c. small intestine
d. large intestine

30 The esophagus is part of the digestive system that ________ .
a. chews the food
b. transfers food to the stomach
c. absorbs nutrients from food
d. transfers air to the lungs

31 Fish extracts oxygen from water by their ________ .
a. skin b. gills c. lungs d. fins

2 Complete the following sentences using the words between the brackets:

1 The fat layer under the animal's skin in order to warm it is a ________ adaptation. (structural - behavioral)

2 The colorful scales in desert lizards is considered a ________ adaptation. (structural - behavioral)

3 A burrow is an excellent place for fennec foxes to stay ________ during the day. (warm - cool)

4 Mangrove trees grow in ________ . (fresh water - salt water)

5 The cactus plant has spines that protect it from being eaten by desert animals, and this is considered a form of ________ . (behavioral adaptation - structural adaptation)

6 The leaves of ________ trees look like your hand. (kapok - acacia)

7 Your ________ mix and grind the food inside your mouth. (teeth - teeth and tongue)

8 ________ is a tube with muscles that pushes the food into the stomach. (Trachea - Esophagus)

9 During exhalation, ________ gas comes out of the lungs. (oxygen - carbon dioxide)

10 The human body uses the ________ system to get nutrients from food. (respiratory - digestive)

11 The lungs are one of the important organs in the ________ system. (respiratory - digestive)

12 The process of pulling air in and pushing air out of the body is called ________ . (respiration - digestion)

13. The diaphragm rises up during ______ . (inhalation - exhalation)
14. Fish breathe ______ gas which is dissolved in water. (oxygen - carbon dioxide)
15. ______ destroys the lungs and causes many diseases. (Breathing - Air pollution)

3 Put (✓) or (✗):

1. Adaptation is the change of the structure or behavior of an organism's body to survive. ( )
2. Foxes have a strong sense of hearing. ( )
3. Polar bears have extra-large ears to lose heat. ( )
4. Fennec foxes live in deserts, while caracals live in forests. ( )
5. Fennec foxes feed on fruits only. ( )
6. The feet of the penguin do not freeze because they have a layer of fat. ( )
7. The body of a polar bear is covered with thick fur. ( )
8. Black bears have dark fur to hide among trees. ( )
9. The fur that some animals possess to protect them from the cold is a behavioral adaptation. ( )
10. The migration of birds to search for food is considered a behavioral adaptation. ( )
11. Some animals that live in cold climates have long ears to help them maintain their body temperature. ( )
12. Animals digging trenches is a form of structural adaptation. ( )
13. Animals can't eat barbary figs because of their sharp spines. ( )
14. Plants have two types of adaptation, structural and behavioral. ( )
15. Plants need long roots that extend deep into the soil to survive in the water scarcity. ( )
16. Sending a smelly message through acacia trees is a behavioral adaptation. ( )
17. Acacia trees grow in the Amazon forest. ( )
18. The needle leaves of pine trees help them lose water. ( )
19. All living organisms need food and oxygen gas to get energy. ( )
20. A pharynx is a common cavity between the digestive and the respiratory systems. ( )
21. Food is turned from a simple form into a complex one in digestion. ( )
22. Your teeth crushes food inside your mouth during chewing. ( )

23 The absorption of the digested food takes place in the stomach. ( )

24 The large intestine absorbs nutrients from the waste. ( )

25 The food passes through the large intestine before it goes to the small intestine. ( )

26 The respiratory system is responsible for the entry of air into the body. ( )

27 When running and making an effort, the number of breathing times decreases. ( )

28 During exhalation, the diaphragm moves upward and relaxes. ( )

29 Carbon dioxide gas is important for the respiration of animals. ( )

30 Exhaled air is loaded with oxygen. ( )

31 Adult frogs breathe using their gills. ( )

32 Amphibians include frogs and salamanders. ( )

33 Frogs are reptiles, while panther chameleons are amphibians. ( )

34 Man cannot restore the ecosystem in any way. ( )

35 Water pollution affects fish, but doesn't affect humans or plants. ( )

4 Write the scientific term:

1 It's the change in a living organism's body or its behavior to be able to survive in its environment.

2 It's a type of adaptation in which the living organism blend in with the surroundings to hide from its prey or predator.

3 It's a change in the structure of the living organism's body to cope with its environment conditions.

4 It's a strategy of camouflage that helps the bull shark sneak up on its prey.

5 It's the process of breaking down food into nutrients to get energy.

6 It's a muscle that has an important role in the respiration process.

7 They're living organisms that live in a moist environment and have two ways of respiration.

8 It's the structure that helps fish to respire underwater.

9 They're air sacs surrounded by blood vessels in the respiratory system.

10 It's a bird that has weaved blood vessels in its feet and toes.

5 Complete the following sentences using the words between the brackets:

1 (Respiration - Water lily - buttress roots)

a. The .... has wide floating leaves.

b. .... includes inhalation and exhalation processes.

c. A kapok tree has .... to fix it in the soggy soil.

2 (penguins - Arctic foxes - bull shark - Fennec foxes)

a. .... pant to lower their bodies temperature.

b. .... and .... are from the animals that can live in the cold weather.

c. A .... can sneak up on its prey using countershading.

6 Choose from column (A) what suits it in column (B):

A

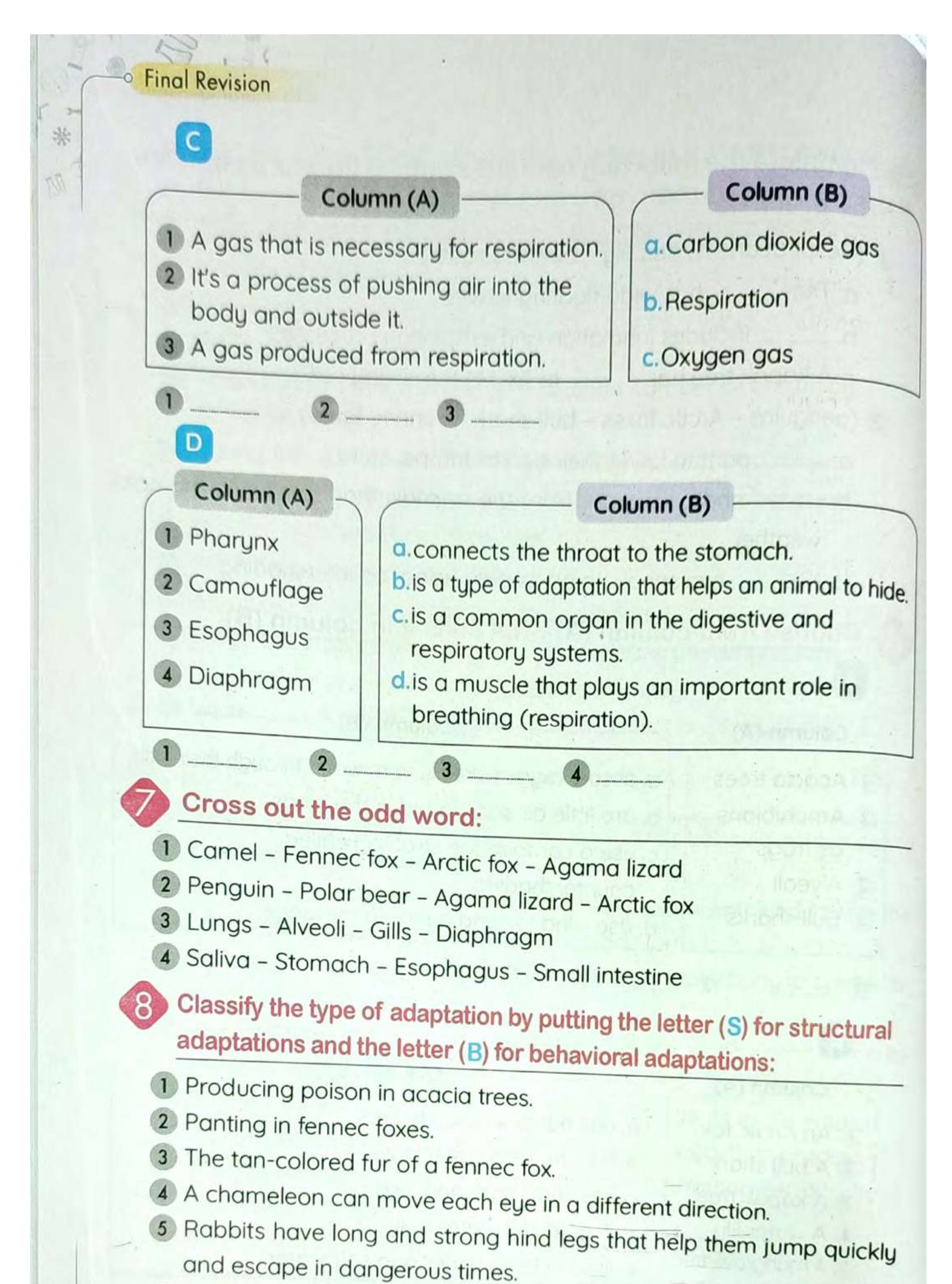
Column (A)	Column (B)
1 Acacia trees	a. absorb oxygen directly from water through their skin.
2 Amphibians as frogs	b. are little air sacs found in the lungs.
3 Alveoli	c. use a camouflage strategy called countershading.
4 Bull sharks	d. use wind to send a smelly message.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 An Arctic fox	a. has hand-shaped leaves.
2 A bull shark	b. lives in fresh water only.
3 A kapok tree	c. has short ears and legs
4 A water lily	d. lives in salt water only.
5 A mangrove tree	e. lives in fresh water and salt water.

1 .... 2 .... 3 .... 4 .... 5 ....



C

Column (A)

1. A gas that is necessary for respiration.
2. It's a process of pushing air into the body and outside it.
3. A gas produced from respiration.

Column (B)

a. Carbon dioxide gas

b. Respiration

c. Oxygen gas

1 ______ 2 ______ 3 ______

D

Column (A)

1. Pharynx
2. Camouflage
3. Esophagus
4. Diaphragm

Column (B)

a. connects the throat to the stomach.

b. is a type of adaptation that helps an animal to hide.

c. is a common organ in the digestive and respiratory systems.

d. is a muscle that plays an important role in breathing (respiration).

1 ______ 2 ______ 3 ______ 4 ______

7 Cross out the odd word:

1. Camel – Fennec fox – Arctic fox – Agama lizard
2. Penguin – Polar bear – Agama lizard – Arctic fox
3. Lungs – Alveoli – Gills – Diaphragm
4. Saliva – Stomach – Esophagus – Small intestine

8 Classify the type of adaptation by putting the letter (S) for structural adaptations and the letter (B) for behavioral adaptations:

1. Producing poison in acacia trees.
2. Panting in fennec foxes.
3. The tan-colored fur of a fennec fox.
4. A chameleon can move each eye in a different direction.
5. Rabbits have long and strong hind legs that help them jump quickly and escape in dangerous times.
6. Some plants have spines to defend themselves against enemies.

9 Answer the following questions:

1. If you find a butterfly that have a color like the color of the tree it lives on, this phenomenon is called ______________________ .
2. Study the opposite two figures. Identify the name of each of the two processes in figures A and B:

   A B

   a. Figure A: ______________
   b. Figure B: ______________
   c. What happens to the diaphragm in figure (A)? ____________ .
3. The system that digests food to produce energy is the ____________ .
4. Chameleons can move each of their eyes in a different direction, this adaptation helps them ______________________ .
5. Some dogs live in a cold environment, while some live in a hot environment. In your opinion, which one has thick fur, the ones living in the cold environment or the hot environment? And why? ______________ .
6. The leaves of plants that float above the surface of the water are so wide that they can ____________ .
7. Animals that have a thick layer of fat under their skin are animals that live in a ____________ environment
8. Mention one animal and one plant that live in rainforests.

   ____

10 Give a reason for:

- Polar bears have thick fur.

  ____

11 What happens if:

- The diaphragm contracts and moves downward?

  ____

Revision

Concept 1.2
Senses at Work

1 Choose the correct answer:

1. The ________ system helps us to translate messages (stimuli) that come from our surroundings.
   a. respiratory b. digestive c. circulatory d. nervous
2. Which of the following carry the message from your eyes to your brain when you see something?
   a. Nerves b. Muscles c. Veins d. Glands
3. Your sensation of hot weather depends on the sensory receptors in your ________ .
   a. eyes b. skin c. nose d. ears
4. Bats become active ________ .
   a. in the morning b. at noon c. at night d. all day
5. A dolphin depends on ______ to locate its prey and objects underwater.
   a. its memory b. its sense of smell
   c. echolocation d. its sense of touch
6. Your ________ is the sensory organ for seeing objects
   a. car b. tongue c. nose d. eyes
7. When you determine a sweet or bitter taste, you use your ________ .
   a. tongue b. eyes c. ears d. nose
8. All the following are components of the nervous system, except the ________ .
   a. spinal cord b. heart c. nerves d. brain
9. A bat is a ________ animal.
   a. nocturnal b. morning c. non-flying d. diurnal
10. A/An ________ is characterized by the ability to move its head in all directions.
    a. panther chameleon b. jerboa
    c. human d. owl
11. The ________ is the main control center in your body.
    a. stomach b. brain c. lung d. liver
12. To detect the place of a table in a completely dark room, you can depend on your sense of ________ .
    a. sight b. touch c. taste d. hearing

13 When your eyes see a red traffic light, that's a signal to ________ .
a. increase your speed
b. decrease your speed
c. keep your speed as it is
d. stop instantly

14 The organ that is responsible for the sense of sight is the ________ .
a. ear b. tongue c. nose d. eye

15 Bats use their ________ to get information about their surroundings in the dark
a. eyes b. tongue c. ears d. hands

16 When an object comes close to your eyes suddenly, ________ occur(s).
a. a reflex action
b. a fast response
c. a slow response
d. a and b

17 Reading and writing are common types of communication in the ________ world.
a. animals' b. plants' c. humans' d. birds'

18 Animals can communicate with each other through ________ .
a. sound and light
b. talking
c. reading
d. writing

19 Humpback whales use singing to ________ .
a. heat themselves up
b. hide from enemies
c. communicate
d have fun

20 Humpback whales sing during ________ months, which is the mating season.
a. winter b. summer spring d. autumn

2 Complete the following sentences using the words between the brackets:

1 The time taken for the body to receive information from the environment is the ________ . (reflex action - response time)

2 The ________ is an animal that can escape from its enemies because of the length of its hind legs. (Arctic fox - jerboa)

3 The eyes send messages to the ________ through the nerves. (brain - spinal cord)

4 A dolphin can locate its prey through its sense of ________ . (hearing - sight)

5 There's an integration between our senses and the ________ system to interact with the surroundings. (respiratory - nervous)

6 ________ can communicate by making sounds like a chatter. (Mongooses - Ants)

7 Sensory receptors send messages from ________ .
(the brain to the muscles - the sensory organs to the brain)

8 The echolocation feature depends on the ________ .
(hearing sense - sight sense)

9 The skin is an important organ of the ________ system.
(respiratory - nervous)

10 The ____ passes through the human's backbone. (spinal cord - brain)

11 The echo is turned into vibrations in the ________ that is/are used by blind people.
(goggles - cane)

12 ________ sing underwater to communicate with each other.
(Bull sharks - Whales)

13 The winter months are considered the ________ season for humpback whales.
(mating - feeding)

14 Humpback whales and dolphins communicate by their ______ sense
(hearing - sight)

15 A group of ants send a ______ message to communicate with each other.
(visual - smelly)

16 ______ communicate using their sense of smell.
(Dolphins - Ants)

3 Put (✓) or (✗):

1. The ear is the organ that detects the sound waves produced from a radio. ( )
2. The brain is responsible for processing information. ( )
3. Bats use their sense of smell to avoid dangers. ( )
4. Humans have a stronger sense of hearing than dolphins. ( )
5. A person can identify the spoiled food through his/her sense of hearing. ( )
6. Ants can know the sweet taste by their sense of smell. ( )
7. The nervous system works separately from the five senses. ( )
8. The sensory receptors in your nose receive the scent of a delicious pizza. ( )
9. The skin is the sensory organ that makes you feel the smoothness of the cloth. ( )
10. Dogs have super senses of smell and sight to recognize friends. ( )

11. Both owls and panther chameleons have a sharp sense of hearing. (   )
12. The jerboa is a rodent that can be found at the same habitat of the caracal. (   )
13. Dolphins have a strong sight sense. (   )
14. Soldier ants send a smelly message in case of a shortage of food. (   )
15. Echo helps dolphins locate their prey in air. (   )
16. The reaction time of a living organism must be less than one second to escape from any danger. (   )
17. The reflexes are fast messages you are barely aware of. (   )
18. Eyes are considered sensory organs of light, not sources of light. (   )
19. Humpback whales change their sound pitch according to the season. (   )
20. Humpback whales can sing underwater. (   )
21. Humpback whales communicate with each other through flashing. (   )
22. Animals can use more than one sense to communicate. (   )
23. Scout ants are responsible for alarming the colony in danger. (   )
24. Bats use their ears to "see" in the dark. (   )

4 Write the scientific term:

1. It's the main control center of the human body.
2. It's a property by which a bat can locate its prey insects through the sound reflected from them.
3. They're animals that are active at night.
4. They are nerves found in the sensory organs to receive information from the surroundings.
5. It's the time taken by a living organism to respond to a danger.
6. It's the system that is responsible for the reflex actions.
7. It's a desert rodent that has large ears and long, hind legs.
8. Ants that are responsible for finding food.
9. Ants that send smelly messages to scout ants when food is low.
10. It's the sense used to differentiate between smooth and rough surfaces.
11. They're messages that are transmitted so fast that you are barely aware of them.

5 Cross out the odd word:

1. Taste - Smell - Hearing - Eyes
2. Reading - Writing - Echolocation - Language
3. Bats - Ants - A blind person's cane - Dolphins

6 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 A jerboa	a. depends on echolocation to find its prey.
2 An owl	b. depends on its hind legs to jump in a zigzag path.
3 A bat	c. is an animal that has a bowl-like face.

1 .... 2 .... 3 ....

B

Column (A)	Column (B)
1 It is similar in its processing of information to a computer.	a. the spinal cord.
2 They carry messages from the brain to all body parts and vice versa.	b. reaction time.
3 When a strange object approaches your eyes,	c. The brain
4 The time taken by a living organism to react is	d. Nerves
5 A bundle of nerves that passes through the backbone is	e. the reflex action occurs.

1 .... 2 .... 3 .... 4 .... 5 ....

7 What happens if:

1. Your foot touches a nail on the ground?
2. The hind legs of a jerboa are short?

8 Answer the following questions:

1. A dolphin can locate living organisms and things under the surface of the water; explain the feature that helps the dolphin to do so.
2. Rabbits have strong and long hind legs that help them jump quickly and escape in dangerous times. Determine the type of adaptation.

Revision

Concept 1.3

Light and Sight

1 Choose the correct answer:

1. ______ energy affects the sensory receptors in the eyes, causing vision.
   a. Sound b. Kinetic c. Light d. Magnetic
2. The organ responsible for the sense of sight is the ______ .
   a. ears b. tongue c. nose d. eyes
3. Each of the following is considered a source of light, except ______ .
   a. fire b. the Sun c. the lamp d. the eye
4. Which of the following is a source of light?
   a. The moon b. Our eyes c. Fire d. Mirror
5. The eyes of nocturnal animals are ______ the human eye.
   a. smaller than b. bigger than c. the same as d. narrower than
6. Both fishing cats and owls ______ .
   a. can swim b. are nocturnal animals
   c. can fly d. can rotate their eyes
7. Humans have ______ eyes than nocturnal animals.
   a. bigger b. smaller c. stronger d. sharper
8. The pupils of nocturnal anir[illegible] open ______ humans' pupils.
   a. wider than b. similar to c. narrower than d. shorter than
9. The eyes of ______ glow in the dark.
   a. bats b. cats c. penguins d. snakes
10. What feature of light helps you see yourself in the mirror?
    a. Refraction b. Ray length c. Shortness d. Reflection
11. Light travels in ______ lines.
    a. curved b. straight c. zigzag d. circular
12. Which of the following material does not form a shadow when light falls on it?
    a. Wood b. Glass c. Carton d. Tree

13. Which of the following allows light to pass through it?
    a. Rock b. The moon c. Wood d. Glass
14. A mirror makes the falling light rays ______ .
    a. pass through it
    b. reflect in different directions
    c. reflect in the same direction
    d. diffuse like that of rough surfaces
15. ______ is/are considered from transparent objects.
    a. Metals b. Lenses c. Mirrors d. Wood
16. All the following are transparent materials, except ______ .
    a. glass b. air c. paper d. lenses
17. All of the following materials are opaque, except ______ .
    a. wood b. the human body c. water d. iron
18. When light falls on a dark surface, ______ .
    a. the surface absorbs the light
    b. light passes through it
    c. the light is refracted
    d. nothing happens
19. A firefly is not a bird, but it is a type of ______ .
    a. amphibians b. lizards c. beetles d. reptiles
20. Changing the pattern of lighting up in a firefly is an example of ______ adaptation(s)
    a. structural and behavioral
    b. physical and behavioral
    c. structural
    d. behavioral
21. ______ produce a chemical reaction inside their bodies.
    a. Butterflies
    b. Fireflies
    c. Houseflies
    d. Owls
22. Raising your thumb up or lowering it down is a kind of ______ .
    a. colors
    b. codes
    c. waves
    d. lights

2 Complete the following sentences using the words between the brackets:

1. The eye pupils of owls open ______ than the eye pupils of humans. (narrower - wider)
2. ______ is from the sources of light. (The moon - Fire)

3. Air and water are .... materials and you can see things through them. (transparent - opaque)
4. Smooth surfaces reflect light in .... direction(s). (the same - different)
5. Light does not pass through .... matter. (transparent - opaque)
6. .... is from the opaque objects. (Carton - Glass)
7. When light is scattered from a surface in different directions, this surface is .... (rough - smooth)
8. The different languages are considered as .... (codes - lights)

3 Put (✓) or (✗):

1. Both humans and animals need a light source to see. ( )
2. The human eyes can see in the dark clearly. ( )
3. Humans can see in dim light better than in bright light. ( )
4. The moon is considered a light source. ( )
5. All nocturnal animals have excellent night vision. ( )
6. Nocturnal animals have eyes that are bigger than the human eyes. ( )
7. Some animals can see clearly at night, such as a wild cats. ( )
8. The fishing cat can't hunt in the dark. ( )
9. Cats have excellent night vision, while bats don't. ( )
10. Wood is a transparent object that allows light to pass through it. ( )
11. The wooden board reflects less light than the mirror. ( )
12. The opaque materials do not let the light pass through. ( )
13. Shadow is formed when light hits a transparent object. ( )
14. Polished surfaces, as mirrors, reflect light rays in the same direction. ( )
15. The light reflection depends on the smoothness of the objects' surface. ( )
16. If I can see my face clearly on a surface, this means that it is a smooth, shiny surface. ( )

17 A written language helps people communicate. ( )

18 Fireflies can communicate with each other using sound energy. ( )

19 Humans use light to communicate, such as using traffic lights. ( )

20 In order for the code to be translated, the brain must identify it. ( )

21 Red and green traffic lights are codes. ( )

4 Write the scientific term:

1 It's the visible form of energy that travels in the form of waves.

2 It's the organ that is affected by light and is responsible for sight.

3 They're objects that emit their own light.

4 It's a tool used by people, and it works as the eyes of fishing cats at night.

5 It's a type of wild cat that has eyes that glow at night.

6 They're materials that allow light to pass through.

7 They're materials that don't allow light to pass through.

8 They are materials that reflect the light rays in one direction.

9 They are materials that diffuse light in different directions.

5 Cross out the odd word:

1 Lenses – Air – Brick – Water

2 Sun – Moon – Fire – Candle

3 Wood – Glass cup – Book – Wall

4 Paper – Wood – Cloth – Mirror

6 Classify the following materials into transparent and opaque materials:

1 A chair made of wood: ....

2 An aluminum pot: ....

3 Air: ....

4 Glasses of glass: ....

7 Classify the following materials into transparent and opaque materials:

(Rock – Glass – Window)

....

8 Classify the following materials into smooth and rough materials:

(Mirror - Cloth - Metal - Wood)

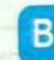
....

9 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 The Sun	a. reflect light rays in one direction.
2 Shadow	b. is formed when the light strikes a human body.
3 The moon	c. is a source of light.
4 Smooth surfaces	d. is shiny but is not considered a source of energy.

1 .... 2 ....  3 ....  4 ....



B

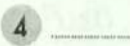
Column (A)	Column (B)
1 Sight	a. is the visible form of energy that is transmitted in the form of waves.
2 Light	b. is a structural adaptation in the eyes that provides some animals with better vision at night.
3 The mirror-like membrane	c. is the sense that helps us see.

1 .... 2 ....  3 ....



C

Column (A)	Column (B)
1 Rough surfaces	a. is a type of communication for humans only.
2 Light travels in	b. light up their wings to attract a mate.
3 Whatching TV	c. diffuse light in different directions.
4 Fireflies	d. straight lines.

1 ....  2 ....  3 .... 4 ....

10 Look at the path of the light rays in pictures (A) and (B).

- Determine which of the two objects is opaque and which is transparent.

(A): ....

(B): ....

A B

11 Which of the following surfaces represents the reflection of light rays from wood and what is the reason?

A B

....

12 Your friend wants to prevent the light from entering his room.

Suggest him some materials that he can use on the window to prevent the light from entering his room. ....

13 Give reasons for:

1. The moon is not considered a source of light.
2. A candle is considered a source of light.
3. Nocturnal animals can see better than humans at night.
4. A cat's eyes glow in the dark.
5. The eyes of humans do not glow like cats in the dark.
6. You can see an object placed behind a glass cup.
7. A shadow is formed when light falls on an opaque object.
8. None of the light energy passes through the opaque objects.

14 What happens if:

1. Light falls on a book?
2. Light falls on a rough surface?

Revision

Concept 2.1

Starting and Stopping

1 Choose the correct answer:

1. When an object is in motion, this means that its ______ changes.
   a. color b. shape c. size d. position
2. When you move something towards you, this represents ______ .
   a. pushing force b. light energy c. pulling force d. sound energy
3. When you sit on a chair, the force of gravity is ______ and holding you on the chair
   a. pulling you upward b. pulling you downward
   c. pushing you upward d. pushing you downward
4. Push or pull actions are considered types of ______ .
   a. forces b. devices c. energies d. adaptations
5. The force that pulls the objects down towards the center of the Earth is ______ force.
   a. gravity b. pushing c. air d. wind
6. The force that occurs when an object rubs against another object is called ______ force.
   a. pull b. push c. gravity d. friction
7. You can see the movement of all the following objects, except the movement of ______ .
   a. a flying airplane b. a running horse
   c. sea waves d. the planet Earth
8. The force that slows down (decreases) the object's speed is called ______.
   a. push b. gravity c. friction d. pull
9. ______ is the ability to do work.
   a. Energy b. Force c. Push d. Pull

10. All the following are examples of pulling force, except ________
    a. pulling the rope
    b. kicking a ball
    c. opening the desk's drawer
    d. lifting up your bag

11. When a body moves forward, the change that occurs is in ________
    a. the position of the body
    b. the size of the body
    c. the mass of the body
    d. Earth's gravity

12. Objects need a force to move, this force is represented in ________.
    a. pushing only
    b. pulling only
    c. pushing and pulling together
    d. the Earth gravity only

13. When a ball stands on the ground without moving, the forces acting on it are ________.
    a. unbalanced
    b. balanced
    c. pushing it up
    d. not equal

14. In the following figure, the body is under the effect of ________.

Smaller Force → [box] ← Greater Force

    a. balanced forces and is moving to the right
    b. forces and is moving to the left
    c. unbalanced forces and is moving to the right
    d. unbalanced forces and is moving to the left

15. The energy gained by a ball when it falls from above is ________ energy.
    a. potential
    b. kinetic
    c. light
    d. chemical

2 Complete the following sentences using the words between the brackets:

1. The car slows down its speed when it runs out of fuel, as a result of ________. (gravity – friction)
2. The ________ forces makes the static object move. (balanced – unbalanced)
3. The force that pulls things down is ________. (friction – gravity)

4. When playing the tug-of-war game, if each team pulls the rope with equal force, the forces are .... (balanced - unbalanced)

5. To slow down the speed of a Shockwave truck, the drivers use ...... parachutes. (5 - 3)

3 Put (✓) or (✗):

1. Air resists the motion of a car. ( )
2. Gravitational force is an upward pulling force. ( )
3. When a pen falls from your hand, the acting force is gravity. ( )
4. When a static body is affected by balanced forces, the body moves. ( )
5. The seesaw moves up and down because the forces that act on it are unbalanced. ( )
6. When the position of the body changes from a fixed point, we can say that the body moves. ( )
7. The force that slows down or decreases the speed of an object is gravity. ( )
8. Gravity pulls objects towards the center of the Earth. ( )
9. When a car crashes into a wall, it will not stop. ( )
10. We eat food to gain energy. ( )
11. Unbalanced forces cause a change in the object's position. ( )

4 Write the scientific term:

1. It's the force that pulls objects towards the center of the Earth.
2. It is a push or pull that is applied to an object making change its position.
3. It's the force that arises when objects rub against each other.

5 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Friction	a. is the ability to do work.
2 Motion	b. is the force that pulls things downwards.
3 Energy	c. is the change of an object's position.
4 Gravity	d. is a force that arises between the surfaces of two contacting bodies.

1 .... 2 .... 3 .... 4 ....

6 Look at the following figure, then answer the question below:

Original Point

A — 70 cm

B — 35 cm

- Which of these toy cars is affected by greater force? (Give reason for your answer.)

....

7 When you sit on the chair without moving:

- What is the name of the force that pulls you downward?

....

....

8 What happens if:

- A boy on a bike stops pedaling?

....

....

Revision

Concept 2.2

Energy and Motion

1 Choose the correct answer:

1. Which ball has kinetic energy but not potential energy?
   a. A ball rolling down a ramp
   b. A ball sitting on a high shelf
   c. A ball bouncing up and down
   d. A ball rolling on a flat sidewalk
2. Which of the following can store energy?
   a. Battery
   b. Wire
   c. Plastic
   d. Rubber
3. The energy gained by a ball when it falls from above is ....
   a. potential energy
   b. kinetic energy
   c. light energy
   d. chemical energy
4. When an object moves down a ramp, its stored potential energy ....
   a. increases
   b. doesn't change
   c. changes to a less active form of energy
   d. changes to a more active form of energy
5. The energy that is stored in an object due to its position is known as ..... energy.
   a. kinetic
   b. potential
   c. electric
   d. chemical
6. The chemical energy stored in batteries is considered a form of ...... energy.
   a. potential
   b. kinetic
   c. heat
   d. light
7. The potential energy of an object depends on ....
   a. its mass only
   b. its height from the Earth's surface only
   c. its mass and its height from the Earth's surface
   d. its temperature
8. All type of energy can be classified into two main groups, which are ....
   a. light and sound energies
   b. chemical and electrical energies
   c. potential and kinetic energies
   d. magnetic and thermal energies

9. Chemical energy can be stored in ________ .
   a. food only
   b. batteries only
   c. television and food
   d. food and batteries

10. The force that makes an object move a distance is called ________ .
   a. work
   b. potential
   c. gravity
   d. pull

11. ________ is the ability to do work.
   a. Energy
   b. Force
   c. Push
   d. Pull

12. When we turn on a television, ________ and ________ energies are produced.
   a. sound – chemical
   b. light – chemical
   c. sound – light
   d. solar – light

2 Complete the following sentences using the words between the brackets:

1. When a person pushes a car forward, his body begins to sweat heavily because his body ________ his stored energy. (increases – consumes)
2. The gas oven converts the ________ energy stored in the natural gas into heat energy to cook the food. (chemical – electrical)
3. What kind of energy is stored inside the battery? (Chemical energy – Heat energy)
4. If the mass of an object decreases, this means that its kinetic energy ________ . (increases – decreases)
5. ________ potential energy is the energy which is stored in a ball at the top of a hill. (Chemical – Gravitational)
6. The amount of energy required to move an object through the force acting on it is called ________ . (work – potential energy)
7. ________ is the ability to do work. (Energy – Gravity)
8. The form of energy that can be seen is ________ energy. (sound – light)
9. The ________ energy is a stored energy in an object due to its position. (kinetic – potential)
10. In an electric bell, electrical energy changes into ________ energy . (sound – light)

3 Put (✓) or (✗):

1. Any moving object has a form of energy known as kinetic energy. ( )
2. When a roller coaster slides down fast, its kinetic energy increases. ( )
3. The moving objects only have energy, while the objects that don't move have no energy. ( )
4. The chemical potential energy in the car's fuel is converted into kinetic energy while running the car. ( )
5. There is a relationship between force and energy. ( )
6. When you kick a ball, kinetic energy is produced. ( )
7. As the height of an object from the Earth's surface increases, its potential energy decreases. ( )
8. In the electric fan, the kinetic energy is converted into electrical energy. ( )
9. Energy is neither destroyed nor created from nothing. ( )
10. A static ball on the ground will move if it is affected by an unbalanced force. ( )
11. A static object at the top of the ramp has no kinetic energy. ( )
12. The chemical energy in a battery can be converted into electrical energy. ( )
13. Any moving object has a form of energy known as light energy. ( )
14. Thermal energy is a type of kinetic energy. ( )
15. Sound and light energies transfer in the air in the form of waves. ( )
16. Unbalanced forces cause a change in an object's position. ( )

4 Write the scientific term:

1. It's the energy that the object gains due to its motion.
2. It is the ability to do work.
3. It is a force that causes an object to move a distance.

4. It's the form of energy that increases when the speed of an object increases.
5. It is the stored energy in an object due to its position.

5 Identify the correct form of energy in the following cases:

1. If a dog is barking at a cat, ... energy reaches your ears. (sound - light)
2. In your cell phone's battery, chemical energy changes into .... energy. (potential - electrical)
3. A girl is skating on the sidewalk, her body has .... energy. (light - kinetic)
4. Your eyes detect the .... energy coming towards you. (light - sound)
5. When gasoline is burned inside a bus engine, ... energy is consumed. (electrical - chemical)
6. If you use a flashlight on a camping trip, ... energy comes out. (chemical - light)

6 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Food	a. increases by increasing the object's speed.
2. Kinetic energy	b. is a source of energy for humans.
3. Potential energy	c. is the stored energy in an object due to its position
	d. cannot be converted into another form of energy.

1. .... 2. .... 3. ....

7 Cross out the odd word:

1. Sound energy – Light energy – Thermal energy – Chemical energy
2. Sound energy – Light energy – Thermal energy – Electrical energy
3. Guitar – Flashlight – Radio – Alarm

Revision

Concept 2.3

Energy and Collisions

1 Choose the correct answer:

1. The speed of a car that travels 200 meters in 2 seconds is ______ m/s.
   a. 20 b. 40 c. 100 d. 200
2. How can we calculate the speed of an object?
   a. Speed = Distance ÷ Time b. Speed = Distance + Time
   c. Speed = Distance x Time d. Speed = Distance – Time
3. The measuring unit of the distance is ______ .
   a. km/s b. km c. seconds d. kg
4. The speed of an object is measured in ______ or meters per second.
   a. kilometers per hour b. grams per second
   c. hours per kilometer d. kilometers per kilogram
5. The result of dividing the distance traveled by the time equals ______ .
   a. the energy b. the force c. the mass d. the speed
6. A human is slower than a horse as the human covers ______ the horse at the same time.
   a. less distance than b. greater distance than
   c. double the distance of d. twice the distance of
7. Which of the following is a measuring unit of speed?
   a. hr/km b. sec/m c. kg/sec d. m/sec
8. The airbag is made of ______ .
   a. carton b. nylon c. rubber d. cotton
9. Kinetic energy isn't affected by the ______ of the object.
   a. mass b. speed c. color d. weight
10. If a car covered a distance of 10 meters in a time of 2 seconds, the speed of the car is ______ .
    a. 50 m/sec b. 20 m/sec c. 20 m/sec d. 5 m/sec
11. The speed of the train which covered 400 m in 2 sec equals ______ m/sec.
    a. 400 b. 100 c. 200 d. 2

12 The .... protect(s) the driver from moving forward in a collision.
a. glass window b. dashboard c. seatbelt d. tires

13 When the object is moving faster, it has .... kinetic energy.
a. the same b. more c. less d. slow

14 A very big truck needs .... to move.
a. a very small engine b. a small engine
c. a very big engine d. no engine

15 When two objects collide, ... is transferred between them.
a. time b. distance c. energy d. nothing

16 During a collision between ...., the force of the collision increases, and the risks increase.
a. a bicycle and a car b. two cars
c. a train and a car d. two trains

2 Complete the following sentences using the words between the brackets:

1 During a car crash, the .... is inflated with a gas to provide a soft cushion. (seatbelt – airbag)

2 Airbags inflate automatically when the .... in the car detect(s) a crash. (seatbelt – sensors)

3 When objects crash, ... transfers between them. (distance – energy)

4 As a result of hitting a ball with a bat, the .... of the ball will change. (direction – mass)

5 Speed is a .... quantity. (physical – chemical)

6 Fast-moving objects cause .... danger than slow-moving objects. (less – more)

7 The big trucks need .... to move. (big engines – small engines)

8 When the car's fuel completely runs out, its .... becomes zero. (mass – speed)

9 The car needs .... to move. (fuel – water)

10 If Noor travels with her bicycle a distance of 10 km in two hours, then she is moving at a speed of .... (10 km/hr – 5 km/hr)

11 .... absorb the energy of the car during a collision. (Airbags – Seatbelts)

12 The speed of a moving object = ...

(Distance × Time - Distance ÷ Time)

13 When the speed of a car increases, its .... energy increases.

(kinetic - potential)

14 On rising a ball in Newton's cradle without leaving it, it stores ...... energy.

(kinetic - potential)

3 Put (✓) or (✗):

1 Seatbelt is one of the safety equipment in cars. ( )

2 After a collision, the airbag deflates at the same speed as it inflates. ( )

3 Drivers should drive as fast as possible to avoid accidents. ( )

4 If a car covered a distance of 10 m in a time of 2 seconds, the speed of the car is 5 m/sec. ( )

5 The high-speed moving objects face less danger than the slower objects. ( )

6 The mass of a moving body affects its speed. ( )

7 As a car's speed increases, the amount of fuel used decreases. ( )

8 Because of the seatbelt, the driver cannot see the road clearly. ( )

9 The amount of energy before collision is greater than that after collision. ( )

10 A thermal energy is produced due to the friction between Newton's cradle parts. ( )

4 Write the scientific term:

1 The process in which two or more objects crash into each other and an energy transfer occurs.

2 Safety equipment that is used to prevent car passengers from moving forward when the car stops suddenly.

3 Safety equipment that provides a soft cushion when it inflates automatically with gas during a collision.

4 A heavy steel ball that swings on a cable and is used in the destruction of building parts.



5 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Gravity	a. is the energy stored inside the body due to its position.
2 Friction	b. is the force that pulls things downwards.
3 Speed	c. is a force that arises between the surfaces of two contacting bodies.
4 Potential energy	d. is the energy stored inside dry batteries.
5 Chemical energy	e. is the distance covered per time unit.

1 ______ 2 ______ 3 ______ 4 ______ 5 ______

6 Answer the following questions:

1. Mention two of the safety equipment in the car.

   ....

2. A train travels from Cairo to Alexandria for a distance of 200 kilometers in 2 hours. Find its speed.

   ....

3. Calculate the speed of a train that covers 600 km in a time of 6 hours.

   ....

4. Two cars moved at the same time for 20 seconds; car (a) covered a distance of 100 meters, while car (b) covered a distance of 300 meters. Which of the two cars has a higher speed?



   ....


7
Government Model Exams

1 Cairo - Official Language Schools

Question (1)

(A) Choose the correct answer:

1. When we turn on a television, ... and........ energies are produced.
   - a. sound - chemical
   - b. light - chemical
   - c. sound - light
   - d. solar - light
2. A very big truck needs .... to move.
   - a. a very small engine
   - b. a small engine
   - c. a very big engine
   - d. no engine
3. A polar climate ....
   - a. is the hottest place on Earth
   - b. is the coldest place on Earth
   - c. looks like the desert climate
   - d. looks like the forest climate
4. The speed of an object is measured in .... or meters per second.
   - a. kilometers per hour
   - b. grams per second
   - c. hours per kilometer
   - d. kilometers per kilogram

(B) Study the follwing table, then complete:

Cars	Car (A)	Car (B)	Car (C)
Speed	200 km/h	400 km/h	500 km/h

Car (........) is the fastest one.

Question (2)

(A) Put (✓) or (✗):

1. Bats use their sense of smell to avoid danger. ( )
2. Fennec foxes live in deserts, while caracals live in forests. ( )
3. The sharp spines protect barbary figs from hungry animals. ( )
4. The moon is considered a light source. ( )
5. Energy is the ability to do work. ( )

(B) Cross out the odd word:

1. The Sun - The moon - Fire - Candle (..........)
2. Bats - Fireflies - A blind person's cane - Dolphins (..........)
3. Guitar - Flashlight - Radio - Alarm (..........)

Question (3)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Oxygen	a. is an animal with a bowl-like face.
2 An owl	b. is the change in the object's position.
3 Motion	c. is a gas necessary for respiration.

1 .... 2 .... 3 ....

(B) Classify the following animals in the table below:

(Fishing cat - Dolphin - Bat)

Animals that have a super sight sense	Animals that have a super hearing sense
....	....
....	....

2 Cairo - Al-Azhar Al-Sharif

Question (1)

- Choose the correct answer:

1. All the following are from the components of the nervous system, except the ....
   a. spinal cord b. heart c. nerves d. brain
2. By increasing the mass of an object, its kinetic energy ....
   a. increases b. decreases c. doesn't change d. is destroyed
3. .... is considered a behavioral adaptation in panther chameleons.
   a. The v-shaped feet b. puffing its body in danger
   c. Each eye moving independently d. The colored scales of its skin
4. Chemical energy is stored in the ....
   a. food only b. battery only
   c. food and TV d. food and battery

Question (2)

- Put (✓) or (✗):

1. A water lily survives in salt water. ( )
2. Energy doesn't change from one form to another. ( )
3. The airbag is one of the safety equipment in cars. ( )
4. Gravity force slows down the speed of an object. ( )
5. the inhaled air contains oxygen gas. ( )

Question (3)

- Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Fennec foxes	a. produce light to warn off predators.
2. Bats	b. pant like dogs.
3. Bull sharks	c. survive in fresh water and salt water.
4. Fireflies	d. depend of the echo to locate the prey.

1 ...... 2 ...... 3 ...... 4 ......

3 Giza – Al-Azhar Al-Sharif

Question (1)

(A) Choose the correct answer:

1. The characteristic of the panther chameleon's eyes is considered ...... adaptation(s).
   (a structural – a behavioral – both structural and behavioral – neither structural nor behavioral)
2. The nervous system of ...... consists of brain, spinal cord and nerves, such as elephants and dogs.
   (rodents – birds – mammals – reptiles)
3. Which of the following organs work together to see different objects?
   (Nose and brain – Eyes and brain – Ears and brain – Tongue and brain)
4. What is the force used to kick a ball by foot? (Pull – Push – Sound – Light)

5 The force that exists between a moving car and the ground on which it moves and that is opposite to the motion of the car is known as the .... (push force - electrical energy - magnetic energy - friction force)

(B) Write the scientific term:

1 They're air sacs surrounded by blood vessels in the respiratory system.
2 It's the sense used to differentiate between smooth and rough surfaces.
3 It's a form of potential energy that causes objects to rush towards Earth's surface.

Question (2)

(A) Put (✓) or (✗):

1 Agama lizards blend in with the green, huge trees to hide from their enemies. ( )
2 The hearing sense in dolphins is stronger than that in humans. ( )
3 Light reflection depends on the smoothness of the surfaces. ( )
4 Unbalanced forces cause a change in the position of an object. ( )
5 Speed = Time ÷ Distance ( )

(B) Cross out the odd word:

1 Saliva - Stomach - Esophagus - Small intestine
2 Spinal cord - Lungs - Nerves - Brain
3 Fishing cats - Owls - Dolphins
4 Bats - Fireflies - Dolphins
5 Sound energy - Light energy - Electrical energy - Thermal energy

4 Al Qalyubia

Question (1)

(A) Choose the correct answer:

1 When you move something towards you, this represents ....
a. pushing force b. light energy c. pulling force d. sound energy
2 When an object is in motion, this means that its ...... changes.
a. color b. size c. position d. shape

3 The .... help(s) the fish obtain dissolved oxygen in the water.

a. gills b. lungs c. tail d. force

(B) What happens if: Your foot touches a nail on the ground?

Question (2)

(A) Put (✓) or (✗):

1 Any moving object has a form of energy known as light energy. ( )

2 Energy is the ability to do work. ( )

3 Nocturnal animals have eyes larger than humans. ( )

4 The wood is a transparent material used in making eyeglasses. ( )

(B) Write the scientific term:

- It's an object that allows light to pass through it.

Question (3)

(A) Complete the following sentences:

1 The form of energy that can be seen is ....

2 If the mass of an object decreases, this means that its kinetic energy ....

3 A dolphin has a sharp sense of ....

4 Fireflies communicate with each other by producing ....

(B) Cross out the odd word:

Light energy – Sound energy – Thermal energy – Chemical energy

5 Alexandria – Montazah Zone 1

Question (1)

(A) Choose the correct answer:

1 The .... deliver(s) food from the pharynx to the stomach.

a. esophagus b. throat c. trachea d. alveoli

2 Carton and wood are .... materials.

a. opaque b. transparent c. liquid d. gaseous

3 A penguin's feet have blood vessels that bring .... up.

a. warm blood b. cold blood c. warm water d. cold water

4 ______ can sing underwater to communicate.

a. Bull sharks
b. Humpback whales
c. Toads
d. Salamanders

(B) Cross out the odd word: Nose - Trachea - Stomach - Lungs

Question (2)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Water lily	a. Its habitat is salty water.
2 Kapok tree	b. Its habitat is fresh water
3 Pine tree	c. Its habitat is Amazon rainforests.
4 Mangrove tree	d. Its habitat is snow.

1 ______ 2 ______ 3 ______ 4 ______

(B) Write the scientific term:

- They are ants that are responsible for finding food.

Question (3)

(A) Put (✓) or (✗):

1 In an electric fan, the electrical energy changes into kinetic energy. ( )
2 The fennec fox has short ears. ( )
3 Potential energy is the energy of a moving body. ( )
4 Light travels in straight lines. ( )

(B) Give a reason for: The body of a chameleon is covered with colored scales.

6 Alexandria – Montazah Zone 2

Question (1)

(A) Choose the correct answer:

1 A/An ______ is an animal that has the ability to turn its head in all directions.

a. snake
b. owl
c. jerboa
d. dolphin

2 ______ energy affects the sensory receptors in the eyes causing vision.

a. Sound
b. Kinetic
c. Light
d. Magnetic

3. All the following are pulling forces, except ....
   a. kicking a ball
   b. lifting up a ball
   c. pulling the rope
   d. gravity
4. Animals communicate with each other through ....
   a. writing
   b. reading
   c. talking
   d. sound and light

(B) Write the scientific term: It's a type of adaptation that helps the animals hide.

Question (2)

(A) Put (✓) or (✗):

1. The moon is a source of light. ( )
2. When a roller coaster slides down, the kinetic energy increases. ( )
3. Nocturnal animals become active in the morning to look for their food. ( )
4. Transparent objects don't allow light to pass through. ( )

(B) Cross out the odd word: Stomach – Diaphragm – Large intestine – Esophagus

Question (3)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Speed	a. The food gets digested completely in it.
2. Small Intestine	b. is the distance covered in unit time.
3. Ants	c. is a measuring unit for long distances.
4. Kilometer	d. depend on their sense of smell to communicate.

1 .... 2 .... 3 .... 4 ....

(B) Choose the correct answer:

- To slow down the speed of a Shockwave truck, the drivers use .... parachutes.

(5 - 6 - 3)

7 Alexandria – East Zone

Question (1)

(A) Choose the correct answer:

1. Digestion of food starts in the ....
   a. esophagus b. lungs c. mouth d. stomach
2. The extra large .... of a fennec fox allow(s) heat to escape and cool(s) the fox.
   a. fur b. face c. ears d. eyes
3. A .... protects the driver from moving forward in a collision.
   a. glass window b. dashboard c. seatbelt d. tire
4. When an object is moving faster, it has .... energy.
   a. the same b. more c. less d. no

(B) Give a reason for: None of the light energy passes through the opaque objects.

Question (2)

(A) Put (✓) or (✗):

1. Exhausts from cars and factories don't affect people's health. ( )
2. The reflexes are fast messages you are barely aware of. ( )
3. A large vehicle causes more damage as it hits the small vehicle with the same speed. ( )
4. The force of gravity is the force that pulls the objects downward. ( )

(B) What happens if: The food in a colony is low?

Question (3)

(A) Complete the following statements:

1. The white fur of the polar bear helps it .... with the ice habitat.
2. The moving car is being slowed down by a force called .... force.
3. The .... energy is a stored energy or the energy of position.

(B) Cross out the odd word: Lungs - Alveoli - Gills - Diaphragm

8 Damnhour Governorate

Question (1)

(A) Choose the correct answer:

1. A panther chameleon uses its .... like a hand.
   a. eyes   b. tail   c. head   d. ears
2. Motion is any change in the .... relative to a fixed starting point.
   a. position   b. weight   c. mass   d. volume
3. The speed of the train that covered 400 m in 2 seconds equals .... m/sec.
   a. 400   b. 100   c. 200   d. 2

(B) What happens if: The diaphragm contracts and moves downward?

Question (2)

(A) Put (✓) or (✗):

1. A fennec fox feeds on fruits only. ( )
2. Potential energy is a form of stored energy. ( )
3. Thermal energy is a type of kinetic energy. ( )

(B) Write the scientific term:

- The force that is exerted when objects rub against each other and it is a force that opposes motion.

Question (3)

(A) Complete the following sentences:

1. The nervous system of mammals consists of the brain, nerves and ....
2. Fireflies produce .... inside their bodies that allows them to communicate.
3. Batteries have potential energy in the form of stored ....
4. Airbags inflate automatically when the .... in cars detect a crash.

(B) Cross out odd word: Air – Water – Wood – Glass

9 Menofia Governorate

Question (1)

(A) Complete the following sentences:

1. Bats use the .... property to find their food, but acacia trees warn the other nearby acacia trees from animals by sending .... massages in the air.
2. Ants use their sense of .... to communicate with each other.
3. Chemical energy is a form of .... energy, but light energy is a form of .... energy.
4. .... and .... are from the safety equipment of cars during collisions.

(B) What is the speed of a train that travels 400 kilometers in 2 hours?

Question (2)

(A) Choose the correct answer:

1. Panting in fennec foxes belong to .... adaptation(s).
   a. structural
   b. behavioral
   c. both behavioral and structural
   d. neither structural nor behavioral
2. The force that is used to kick a ball with your legs is a .... force.
   a. pull
   b. push
   c. sound
   d. light
3. By increasing the speed of an object, its .... energy increase(s).
   a. potential
   b. kinetic
   c. potential and kinetic
   d. chemical

(B) Give a reason for: You can see clearly through your lenses.

Question (3)

(A) Put (✓) or (✗):

1. The diaphragm contracts and moves upward during inhalation. ( )
2. Kapok trees have buttress roots. ( )
3. The battery stores chemical energy. ( )
4. A rocket is affected by balanced forces, so it can move away from Earth. ( )

(B) What happens if: The jerboas' legs are all short?

10 Kafr El-Sheikh Governorate

Question (1)

(A) Choose the correct answer:

1. Both acacia trees and kapok trees have the same ....
   a. habitat b. shape c. roots d. trunk
2. .... forces cause the movement of static objects.
   a. Balanced b. Unbalanced c. Friction d. Equal

(B) What happens if: A boy on a bike stops pedaling?

Question (2)

(A) Put (✓) or (✗):

1. The large intestine absorbs fat from waste. ( )
2. Penguins can stand on ice all day. ( )
3. A static object at the top of the ramp has no kinetic energy. ( )
4. Sound and light energies transfer in the air in the form of waves. ( )

(B) Write the scientific term:

- The time taken by an organism's body to respond to danger.

Question (3)

(A) Complete using the words between brackets:

(light - sound - head - truck)

1. Gills are found on both sides of the fish's ....
2. The eye is the sensory organ that is affected by ....
3. A .... has the biggest engine.
4. Collision between moving objects always produces .... energy.

(B) Cross out the odd word: Brain - Lungs - Nerves - Spinal cord

11 Mansoura Governorate - Model (A)

Question (1)

(A) Choose the correct answer:

1. Raising your thumb up or lowering it down is a kind of ________.
   (colors - codes - waves - lights)
2. You have the greatest potential energy when you are standing at a height of ________.
   (70cm - 90cm - 110cm - 150cm)
3. ________ is one of the behavioral adaptations that helps an animal protect itself from enemies. (Camouflage - Extinction - Immigration - Reproduction)
4. All the following are from the components of the nervous system, except the ________.
   (spinal cord - heart - brain - nerves)

(B) What is the kind of energy inside an object ready to do work?

Question (2)

(A) Put (✓) or (✗):

1. Adaptation does not help living organisms survive. ( )
2. Unbalanced forces cause the motion of objects. ( )
3. Nocturnal animals have bigger eyes than human's eyes. ( )
4. If you took a bus and stopped suddenly on the road, your body will move backward. ( )

(B) Give a reason for: Fishing cats can hunt their prey in darkness.

Question (3)

(A) Complete the following sentences:

1. On running and doing effort, the rate of your breath ________.
2. ________ is one of the safety means in a car.
3. ________ is the ability to do work.
4. Fireflies communicate by ________.

(B) Look at the light rays in figures A and B, which of them is an opaque object and which is a transparent one?

....

Figure (A)	Figure (B)

12 Mansoura Governorate - Model (B)

Question (1)

- Complete the following sentences with words between brackets:

1. The ______ processes and interprets information. (spinal cord - brain)
2. Which of the following surfaces reflects light better? (Wood - Metals)
3. ______ force helps objects to fall towards the ground. (Friction - Gravity)
4. When the push force applied on an object on a flat road increases, ______. (potential energy of the object increases - kinetic energy of the object increases)
5. Bats can hunt insects at night depending on ______. (their strong sense of vision - the echo)

Question (2)

- Put (✓) or (✗):

1. The diaphragm helps in the processes of inhalation and exhalation. ( )
2. Friction force acts in the same direction of motion of the object. ( )
3. When a collision happens between two objects, they exchange their energies. ( )
4. Communication and information transfer occur only in humans. ( )
5. Desert plants are characterized by their big leaves. ( )

Question (3)

- Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. The pencil falling towards the ground represents	a. light and thermal energies.
2. Whales communicate by	b. help fish to extract the dissolved oxygen in water.
3. In the large intestine,	c. a pull force.
4. The produced energies when we turn on a lamp are	d. singing.
5. Gills	e. liquids are absorbed from the undigested food.

1. ______ 2. ______ 3. ______ 4. ______ 5. ______

13 Fayoum Governorate

Question (1)

(A) Choose the correct answer:

1. Raising your thumb up or lowering it down is a kind of ________ .
   a. colors b. codes c. waves d. lights
2. A bat is a ________ animal.
   a. nocturnal b. morning c. harmful d. non-flying
3. When a moving car stops suddenly, the passenger's body moves to the ________ direction.
   a. right b. left c. forward d. backward
4. The speed of a car that travels 100 meters in 5 seconds is ________ m/s.
   a. 20 b. 40 c. 100 d. 200

(B) Complete:

- Fishing cats have the ability to see in the dark because of the presence of ________ .

Question (2)

(A) Put (✓) or (✗):

1. The ear is the sensory organ responsible for seeing objects. ( )
2. The respiratory system is responsible for the entry of air into the body. ( )
3. Because of the seatbelt, the driver cannot see the road clearly. ( )
4. The chemical potential energy in the car fuel is converted into kinetic energy. ( )

(B) Write the scientific term: It's the body's main control center.

Question (3)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Kinetic energy	a. is an animal with a bowl-like face.
2 Gravity	b. are structural adaptations whose function is similar to that of the lungs.
3 An owl	c. is the gained energy during the motion of an object.
4 Gills	d. is the force that pulls things down.

(B) Look at the path of the light rays in figures (A) and (B).
Determine which of the two objects is opaque and which is transparent.
(A): ________ (B): ________

Figure (A) Figure (B)

14 Dakahlia Governorate

Question (1)

(A) Choose the correct answer:

1. Bats are .... animals.
   a. nocturnal b. morning c. non-hearing d. non-flying
2. .... is the ability to do work.
   a. Energy b. Force c. Push d. Pull
3. All the following are components of the nervous system, except ....
   a. the spinal cord b. the heart c. the nerves d. the brain
4. The chemical energy stored in batteries is considered a form of ....
   a. potential energy b. kinetic energy c. heat energy d. light energy

(B) Give a reason for:

- Some types of lizards that live in rocky areas have colorful scales.

Question (2)

(A) Put (✓) or (✗):

1. In order for the code to be translated, the brain must identify It. ( )
2. When a pen falls down from your hand, the acting force is the gravity force. ( )
3. The respiratory system is responsible for the entry of air into the body. ( )
4. In Newton's cradle, the kinetic energy of the moving balls increases as time passes. ( )

(B) What happens if: Bats cannot use the echolocation property?

Question (3)

(A) Choose from column (A) what suits it in cloumn (B):

Column (A)	Column (B)
1. Kinetic energy	a. is a form of energy that affects our ears.
2. Thermal energy	b. is produced due to the friction between the moving balls of Newton's cradle.
3. Sound energy	c. is the gained energy during the motion of an object.

(B) Complete the following sentences from the two brackets:

1. The eyes send messages to the .... through the nerves. (brain - spinal cord)
2. The fat layer under the animal's skin to warm it is considered a .... adaptation. (structural - behavioral)

(C) Calculate the speed of a train that covers 500 kilometers in 5 hours.

15 Beni Suif Governorate

Question (1)

(A) Choose the correct answer:

1. Oxygen gets into the lungs during the .... process.

   (inhalation - exhalation - digestion - excretion)

2. You could determine how high the sound is by the .... of the sound.

   (type - pitch - style - echo)

3. The .... system is responsible for the digestion of food.

   (respiratory - digestive - nervous - circulatory)

4. The stored energy inside an object is called .... energy.

   (kinetic - thermal - potential - sound)

(B) Determine the type of adaptation (structural) or (behavioral):

The panther chameleon puffs its body with air to appear bigger in size.

Question (2)

(A) Complete using (brain - Carton - sharp spines - Gravity):

1. Acacia trees have .... around their leaves to protect them if an animal tries to eat them.
2. .... is an opaque object.
3. .... force makes objects fall towards the Earth.
4. The .... is considered the control center of the body.

(B) What happens if: Balanced forces act on a static object?

Question (3)

(A) Put (✓) or (✗):

1. The kinetic energy of an object decreases when its speed decreases. ( )
2. Writing is a way of communication between animals. ( )
3. Energy is not destroyed, but it changes from one form to another. ( )

(B) Cross out the odd word: Speed - Energy - Distance - Time

16 Port Said Governorate

Question (1)

(A) Choose the correct answer:

1. The presence of thick white fur is an adaptation in ....
   a. starred agama lizards b. polar bears
   c. fennec foxes d. forest bears
2. Fish use their .... to breathe in water.
   a. tail b. eyes c. lungs d. gills
3. When the objects collide with each other, ... is transferred between them.
   a. time b. distance c. energy d. nothing
4. What force do you use to kick a ball with your leg?
   a. Pull b. Push c. Sound d. Light

(B) Write the scientific term:

- It's a property by which a bat can locate its prey insects through the sound reflected from them.

Question (2)

(A) Put (✓) or (✗):

1. Animals that are active during the daytime are called nocturnal animals. ( )
2. Eyes are considered sensory organs of light, not as sources of light. ( )
3. Gravity pulls objects upward. ( )
4. Unbalanced forces cause a change in the object's position. ( )

(B) Write the name of:

- An animal that can turn its head in all directions.

Question (3)

(A) Complete the following sentences:

1. The leaves of .... trees look like your hand.
2. The human body uses the .... system to get nutrients from food.
3. .... is one of the safety equipment which are used in cars.
4. When the speed of a car increases, its .... energy increases.

(B) What is the type of adaptation? Tan-colored fur of fennec foxes

17 Ismailia Governorate

Question (1)

(A) Complete the following statements:

1. An Arctic fox has .... ears to help it stay warm.
2. The spinal cord belongs to the .... system.
3. The force that pulls things down to the ground is ....
4. The form of energy that can be seen is .... energy.

(B) Give a reason for: A jerboa has long, hind legs.

Question (2)

(A) Write the scientific term:

1. They're the materials that allow light to pass through.
2. It's the process in which two objects crash into each other.
3. They're the characteristics that help living organisms survive and reproduce.
4. It's the force exerted when objects rub against each other.

(B) What happens if:

You place an opaque object between a light source and a wall?

Question (3)

(A) Choose the correct answer:

1. All the following are organs of the respiratory system, except the ....
   a. nose b. lung c. trachea d. large intestine
2. The chemical energy stored in batteries is considered a form of .... energy.
   a. potential b. kinetic c. heat d. sound
3. By increasing the .... , kinetic energy increases.
   a. speed b. height c. sound d. light
4. Rising a thumb up or lowering it down is a kind of ....
   a. sound b. codes c. waves d. heat

(B) Cross out the odd word: Owls - Fishing cats - Bull sharks - Bats

18 Red Sea Governorate

Question (1)

(A) Choose the correct answer:

1. Fish breathe oxygen gas dissolved in water through their ....
   (skin - gills - lungs - tail)
2. .... is one of the opaque objects that doesn't allow light to pass through.
   (Glass - Air - Water - Carton paper)
3. All the following from the components of the nervous system, except the ....
   (spinal cord - heart - nerves - brain)
4. Objects fall down towards the Earth's center by the force of ....
   (gravity - pushing - friction - pull and push)

(B) Why are some animals able to see in the dark?

Because ....

Question (2)

(A) Complete from the brackets below:

1. The organ that is responsible for sight is the .... (ear - eye)
2. When the speed of an object increases, its .... energy increases.
   (kinetic - potential)
3. The .... is a tube that has muscles to move the food down into the stomach.
   (trachea - esophagus)
4. When an electric lamp is turned on, ... energy is produced.
   (light - chemical)

(B) What happens if: Light falls on a shiny, smooth surface like a mirror?

Question (3)

(A) Put (✓) or (✗):

1. A fennec fox live in a polar region. ( )
2. The sense of hearing of dolphins is stronger than that of humans. ( )
3. Energy is the ability to do work. ( )
4. Static objects move when they are affected by balanced forces. ( )

(B) Acacia trees have very long roots to search for water.

Mention the type of adaptation.

19 Sohag – Al-Azhar Al-Sharif

Question (1)

(A) Choose the correct answer:

1. The .... system is responsible for supplying the body with oxygen and getting rid of carbon dioxide gas.
   a. nervous b. respiratory c. digestive d. motor
2. Light rays scatter when they reflect from ....
   a. the lenses of glasses b. a metallic surface
   c. a mirror d. a wooden board
3. When a car moves down a hill, ...
   a. potential energy changes to kinetic energy
   b. kinetic energy changes to potential energy
   c. no energy change happens d. the car doesn't have energy at all.

(B) Put (✓) or (✗):

1. Speed transfers when collision occurs between a ball and a bat.( )
2. A part of the kinetic energy is converted into sound energy during collision. ( )
3. Soldier ants communicate by sending smelly messages when in danger. ( )

Question (2)

(A) Complete using the words: structural – colored scales – whale – reflection

1. A panther chameleon has .... to hide and hunt.
2. A .... communicates by singing.
3. The thin layer existing in the eyes of nocturnal animals is an example of .... adaptation.

(B) Correct the underlined words:

1. The spinal cord is the main control organ in the body.
2. Matter is the force which pulls objects down towards the Earth.
3. Opaque objects allow light to pass through them.

Question (3)

· Choose from column (A) what suits it in cloumn (B):

Column (A)	Column (B)
1. The small intestine	a. dense fur.
2. Animals that live in cold regions have	b. work.
3. When you kick a ball, you are doing	c. digests food completely.

20 Assuit

Question (1)

(A) Complete these sentences with words between brackets

1. If a plant is living in desert, its roots are ....
(long and thick - weak and short)
2. The system which is responsible for reflexes is the .... system.
(digestive - nervous)
3. Objects fall on the ground because of ....
(gravity - friction)
4. Any static object lying at a height from Earth's surface has .... energy.
(thermal - potential)

(B) Mention the type of adaptation in bird immigration.

Question (2)

(A) Put (✓) or (✗):

1. All animals have the ability to see at night. ( )
2. If the brain cannot recognize a code, it can translate this code. ( )
3. The object moves at a great speed if it is pushed by a great force. ( )
4. When the car stops suddenly, your body moves backward. ( )

(B) Write the scientific term:

It's the object that allows light to pass through it.

Question (3)

(A) Complete using the words below:

(collision - unbalanced - hearing - exhalation)

1. During .... process, the diaphragm relaxes.
2. The forces that act on a static object and cause its motion are .... forces.
3. Dolphins have a super sense of ....

(B) Cross out the odd word:

Penguin - Polar bear - Agama lizard - Arctic fox

8 Model Answers



Unit 1

Concept 1

Lesson 1

1
1 c 2 d 3 d 4 a
5 c 6 d 7 a 8 b
9 c 10 b 11 d 12 d
13 a 14 b 15 c 16 d
17 d

2
1 die 2 fats 3 scales
4 coldest 5 human
6 cold 7 polar 8 Camouflage
9 thick 10 black 11 fennec foxes

3
1 ✗ 2 ✗ 3 ✓ 4 ✗
5 ✓ 6 ✗ 7 ✗ 8 ✗
9 ✗ 10 ✗

4
1 d, d 2 a, c 3 e, e 4 c, a

5
1 Adaptations 2 Penguin
3 Blood vessels 4 Fat layer
5 Habitat 6 Camouflage
7 Caracal 8 Polar bear
9 Fennec fox

6
1 polar bear, snow
2 brown bear, trees
3 cold, warm
4 prey, predators

7
1 Thick fur 2 White feathers
3 Penguin 4 Polar bear

8
1 (1), (3) 2 (4)
3 (2), (5), (6) 4 (5)

9
1 (B) 2 (A)

10
1 To survive in their environment.
2 To stay cool and avoid hot weather in the daytime.
3 Because the blood vessels in its feet and toes are weaved to allow the exchange of heat between warm and cold blood.
4 To keep its body warm.
5 To stay warm and sneak up on its prey.
6 To hide from its prey or predators.

11
1 The human can stand on ice barefoot all day without being frozen.
2 It can't sneak up on its prey.
3 Its feet will freeze.
4 It couldn't hide from its prey or predators.

Concept 1

Lesson 2

1
1 a 2 c 3 c 4 c
5 c 6 d 7 c 8 b
9 b 10 d 11 b 12 d
13 d 14 d 15 d 16 b
17 b 18 c 19 d 20 b
21 b 22 d 23 b

2
1 large 2 shorter
3 Arctic 4 short
5 Arctic 6 lack
7 brown 8 behavioral
9 salt 10 separately
11 tail 12 rocks 13 yellow
14 kapok trees 15 trunk
16 savannah 17 behavioral
18 Catching sunlight
19 wind 20 soggy
21 savannah grasslands

3
1 ✓ 2 ✓ 3 ✗ 4 ✓
5 ✗ 6 ✗ 7 ✗ 8 ✗
9 ✓ 10 ✗ 11 ✓ 12 ✗
13 ✗ 14 ✓ 15 ✓ 16 ✗
17 ✓ 18 ✗ 19 ✗ 20 ✗
21 ✓

4
1 Behavioral adaptation
2 Structural adaptation
3 Bull shark 4 Fennec fox
5 Arctic fox
6 Countershading
7 Panting 8 Burrow
9 Amazon rainforest
10 Savannah 11 Taproots root
12 Buttress roots 13 Kapok tree
14 Acacia tree
15 Behavioral adaptation
16 Trunk 17 Poison

5
1 Wide leaves 2 Acacia tree

6
1 Trees: Acacia tree, kapok tree
a. Grassland b. Drought
c. mild d. Soggy
e. it is easy f. Strong
2 Acacia tree : Savannah, umbrella shape, taproots, tiny leaves
Kapok tree : Amazon rainforest, umbrella shape, buttress roots, hand-like leaves

7
1 structural.
2 air, behavioral 3 bull shark
4 fennec fox, Arctic fox
5 independently

8
1 **Fennec fox** : Desert, tan-colored fur, long ears
2 **Arctic fox:** Tundra, white in winter and brown or grey in summer, short ears

9
1 c, e 2 e, c 3 d, a 4 b, d
5 a, b

10
1 B 2 B 3 B 4 B
5 B 6 S 7 B 8 S
9 B 10 S

11
1 A fennec fox has extra-large ears to stay cool, but the Arctic fox's short ears keep it warm.
2 Due to the lack of food.
3 To cut the prey's flesh.
4 To sneak up on its prey.
5 Because only bull sharks can survive in fresh water.
6 To search for its prey and look out for its enemies at the same time.
7 To hold on the tree's branches.
8 To scare its enemies.
9 Because plants have structural and behavioral adaptations.
10 The acacia tree's roots help it search for water, but the roots of a kapok tree fix the tree firmly in the soggy soil.
11 The tiny leaves reduce the water loss, and the spines are to not be eaten by animals.
12 To let the wind pass through its leaves without being torn.

12
1 Its color will change to yellow.
2 It moves to a river to search for food.
3 It couldn't sneak up on its prey.

4 It will surprise its prey.
5 It couldn't move them independently.
6 It wouldn't hide from its prey or predators.
7 They won't get the needed water.
8 The acacia tree secretes poison that makes its leaves taste bad.
9 It will get broken by the strong wind.

Concept 1
Lesson 3

1

1 d	2 d	3 b	4 c
5 d	6 b	7 d	8 b
9 d	10 c	11 a	12 d
13 a	14 b	15 a	16 a
17 d	18 b	19 b	20 d
21 c	22 b	23 d	24 d
25 c	26 d	27 c	28 b
29 d	30 a	31 b	32 d
33 c	34 d	35 b	

2

1 triangular 2 wide
3 Water lilies 4 long
5 yellow 6 teeth and tongue
7 esophagus
8 small intestine
9 small intestine
10 large intestine
11 anus 12 small intestine
13 water 14 blood
15 anus 16 carbon dioxide
17 carbon dioxide 18 running
19 respiratory 20 exhalation
21 expands 22 blood
23 bronchi 24 blood vessels
25 enlarges 26 exhale
27 pharynx 28 ribs
29 alveoli 30 trachea

3

1 ✓	2 ✗	3 ✗	4 ✗
5 ✓	6 ✗	7 ✗	8 ✓
9 ✗	10 ✓	11 ✓	12 ✗
13 ✓	14 ✗	15 ✗	16 ✗
17 ✗	18 ✓	19 ✗	20 ✗
21 ✓			

4

1 Pine tree 2 Water lily
3 Mangrove tree 4 Needle leaves
5 Digestion process
6 Digestive system
7 Small intestine 8 Mouth
9 Saliva 10 Stomach
11 Esophagus 12 Large intestine
13 Small intestine 14 Small intestine
15 Inhalation process
16 Alveoli 17 Diaphragm
18 Bronchioles 19 Pharynx

5

1 Kapok tree 2 Polar bear
3 Mangrove tree 4 Trachea
5 Stomach 6 Throat
7 Exhalation

6

1 oxygen, energy 2 teeth, tongue
3 esophagus, trachea
4 alveoli, blood vessels

7

1 **Palm Tree:**
Habitat: Desert,
Roots Shape: Long and thick roots
- **Mangrove Tree:**
Habitat: Salt water
Roots Shape: Long and strong

2 **Water Lily:**
Habitat: Fresh water (wetland)
Leaves Shape: Wide leaves
- **Acacia Tree:**
Habitat: Savannah
Leaves Shape: Tiny leaves

3 **Inhalation:**
Diaphragm: Contracts and moves down
Chest Size: Increases
Air Rich in: Oxygen gas
- **Exhalation:**
Diaphragm: Relaxes and moves up
Chest Size: Decreases
Air Rich in: Carbon dioxide gas

8 **Digestive System:** Stomach – Anus – Tongue – Small intestine
Respiratory System: Diaphragm – Trachea – Nose – Lungs – Alveoli
Both Systems: Pharynx

9 1 b, d 2 d, a 3 e, b 4 a, e

10 (A) 1 d 2 f 3 a 4 b
5 e 6 c
(B) 1 c 2 d 3 b 4 a

11 1 Structural 2 Behavioral
3 Structural 4 Structural
5 Structural

12 1 palm tree, desert, narrow, resist wind
2 acacia tree, savannah, tiny, prevent water loss
3 pine tree, snow, needle-like, prevent water loss
4 kapok tree, Amazon forests, hand-like, allow wind to move through the leaves without cutting them

13 **Figure (A):**
1 Mouth 2 Esophagus
3 Liver 4 Stomach
5 Pancreas
6 Large intestine
7 Small intestine

Figure (B):
1 Nose 2 Pharynx (Throat)
3 Trachea 4 Lungs
5 Diaphragm

14 1 To absorb a large amount of sunlight.
2 To resist the strong wind.
3 To let the snow slide down and not get the branches broken.
4 To get energy.
5 Because they crush, moisten and mix the food to be swallowed easily.
6 Because they pour their juices in the small intestine to complete the food digestion.
7 Because when it contracts, oxygen gas enters the lungs; and when it relaxes, carbon dioxide gas is expelled out of the body.
8 To keep our respiratory system healthy.
9 To keep our digestive system healthy.

15 1 It won't resist the strong wind and it will get broken.
2 The snow won't slide down causing its branches to break down.
3 Food won't get moistened and won't be swallowed easily.
4 They will harm our digestive system.

5 The chest size decreases and carbon dioxide gas is expelled out of the body.

Concept 1
Lesson 4

1
1 b 2 c 3 c 4 b
5 c 6 b 7 d 8 a
9 b

2
1 Carbon dioxide 2 structural
3 gills 4 gills
5 soil 6 seeds 7 Water
8 gills 9 Water 10 restore
11 negative

3
1 ✗ 2 ✗ 3 ✓
4 ✓ 5 ✗ 6 ✗

4
1 blood vessels 2 lungs, air
3 Smog 4 asthma

5
1 Gills 2 Dying crops

6
1 Lungs 2 Gills
3 Blood vessels 4 Oxygen gas
5 Carbon dioxide gas

7
1 d 2 e 3 b 4 a
5 c

8
1 Replanting removed forests
2 Removal of air and water pollutants

9
1 Humans' lungs extract oxygen from air, but fish's gills extract oxygen from water.
2 Because they may cause disappearance of plants and animals living in the environment.
3 Due to the high level of air pollution.
4 As they contain smog that causes air pollution.

10
1 They can breathe underwater.
2 It makes it hard for humans to breathe.
3 It causes lung damage, asthma and breathing problems.

Concept 1
Lesson 5

1
1 d 2 c 3 c 4 d
5 c 6 d 7 b 8 b
9 d 10 c

2
1 structural 2 rainforests
3 lungs 4 Humans
5 amphibian 6 skin
7 increases 8 dry
9 viruses

3
1 ✗ 2 ✗ 3 ✓ 4 ✓
5 ✗ 6 ✓ 7 ✗ 8 ✓

4
1 Salamanders 2 lungs, air
3 gills, water

5
1 Fish 2 Palm tree

6
1 Amphibians 2 Oxygen gas
3 Skin 4 Lungs
5 Endangered species

7
1 b 2 c 3 a

8
1 To save them from extinction.
2 Because they can respire oxygen in water through their skin and through their lungs on land.
3 Because they only can survive

in a moist environment and the savannah is a dry one.

9 Their population decreases, and they may go extinct.

Concept 2
Lesson 1

1
1 c 2 b 3 c 4 d
5 b 6 d 7 a 8 b

2
1 hearing sense 2 sound
3 solid 4 touch 5 smell
6 reflection 7 structural
8 sharper 9 hearing

3
1 ✗ 2 ✗ 3 ✗ 4 ✓
5 ✗ 6 ✗ 7 ✓

4
1 monkey 2 smell
3 echolocation

5
1 Bull shark 2 Touch
3 Tongue

6
1 Echo 2 Echolocation
3 Hearing sense 4 Tongue
5 Smell sense 6 Tongue

7
(A) 1 b 2 d 3 a 4 c
(B) 1 d 2 c 3 a 4 e
5 b

8
1 To communicate with each other to move and search for food.
2 Because they depend on echolocation to locate their prey.

9
1 The sound waves bounce back in the form of an echo and the dolphin locates its prey.
2 They can't find their prey in dark water.

Concept 2
Lesson 2

1
1 d 2 a 3 c 4 c
5 c 6 b 7 c 8 d
9 a 10 a 11 c 12 d
13 d 14 c 15 b 16 d
17 a 18 c 19 b 20 c
21 c 22 d

2
1 nervous 2 behavioral
3 head 4 bowl 5 feathers
6 bat 7 owl 8 brain
9 eye 10 backbone
11 nerves 12 nose
13 nervous 14 jerboa
15 decreases 16 delayed
17 zigzag 18 structural
19 desert 20 Hair

3
1 ✓ 2 ✗ 3 ✗ 4 ✓
5 ✓ 6 ✓ 7 ✓ 8 ✓
9 ✓ 10 ✗ 11 ✗ 12 ✓
13 ✗ 14 ✓ 15 ✗ 16 ✗
17 ✓

4
(A) 1 message, brain, nerves
2 mammal, rodent
3 owl
(B) 1 reaction time
2 decreases, survive
3 ears, long
4 zigzag
5 danger

5
1 Nocturnal animals
2 Echolocation 3 Bat 4 Owl
5 Nervous system 6 Brain
7 Spinal cord 8 Nerves

9 Sensory receptors

10 Jerboa

11 Nervous system

12 Reaction time 13 Brain

14 Behavioral adaptation

6 1 Panther chameleon

2 Heart 3 Jerboa

7 Senses: Sight - Smell - Touch - Hearing - Taste

Sensory Organs: Tongue - Nose - Eye - Ear - Skin

8 - Echolocation: Dolphin - Bat

- Camouflage: Fennec fox - Chameleon - Bull shark

9 (A) 1 c 2 b 3 d 4 a

(B) 1 c 2 b 3 d 4 a

(C) 1 b 2 a 3 c

10 1 Nervous system 2 No

3 a. Brain b. Spinal cord

c. Nerves

11 1 (1), echolocation

2 (3), desert

3 (2), a bowl-shaped

4 nocturnal, night, darkness

12 a. 5 b. 3 c. 1

d. 4 e. 2

13 1 To surprise their prey in the dark, escape from the hot weather at the day and due to the availability of the prey at night.

2 Because they depend on the echolocation property.

3 To pick up and amplify distant sounds and direct them to the ears.

4 Because it processes the information gathered by the sensory organs and sends the proper responses.

5 Because it helps the living organism stay safe and avoid danger in their environment.

6 To hear any movement of a nearby snake.

7 To jump long distances and escape from any danger.

8 To catch the sand while jumping.

14 1 They return back in the form of echo that is picked up by the bat's ears and locate the insect.

2 It translates them and sends the proper response.

3 She withdraws her hand quickly.

4 It jumps quickly in less than a second.

Concept 2

Lesson 3

1 1 b 2 d 3 c 4 d

5 b 6 c 7 d

2 1 brain 2 tongue

3 brain 4 nose 5 brain

6 hearing 7 fast

3 1 ✓ 2 ✓ 3 ✗ 4 ✓

5 ✓ 6 ✗ 7 ✓ 8 ✓

4 1 withdraw, reflex

2 skin 3 nervous system

4 breathe

5
1. Sensory receptors
2. Nerves
3. Brain
4. Spinal cord
5. Reaction time
6. Reflex actions
7. Tongue
8. Touch sense

6
1. Stomach
2. Touch
3. Tongue

7 **Sensory receptors:** They receive information from the surroundings.
Brain: It translates and processes information gathered by the sensory organs and sends a proper response.

8
1. Figure (2)
2. Figure (3)
3. Figure (1)
4. Figure (4)

9 a. 5 b. 2 c. 4 d. 1 e. 3

10 Because it translates information from the surroundings and tells the body how to react.

11 You blink as a reflex action.

Concept 2
Lesson 4

1
1. d 2. c 3. b 4. b
5. a 6. a 7. c 8. a
9. c 10. c 11. d 12. c
13. b 14. c 15. d 16. c

2
1. smell
2. shortage
3. hearing
4. higher
5. different
6. vibrations
7. high
8. thumb
9. echo

3
1. ✗ 2. ✗ 3. ✗ 4. ✗
5. ✓ 6. ✓ 7. ✗ 8. ✗
9. ✗ 10. ✗ 11. ✓

4
1. blind person's cane
2. Bats
3. sight
4. sound
5. Humpback whales
6. smell

5
1. Colony
2. Smell
3. Touch
4. Hearing
5. Nurse ants
6. Scout ants
7. Soldier ants
8. Humpback whales
9. Echolocation
10. A blind person's cane

6
1. Echolocation
2. Bats
3. Ants
4. Man
5. Owl
6. Ants

7 **Hearing Sense:** Humpback whales - Bats
Smell Sense: Ants
Touch Sense: A blind person's cane

8
1. Figure (1)
2. Figure (1)
3. Figure (2)
4. Figure (4)
5. Figure (3)
6. Figure (1)

9 1. ✓ 2. ✓ 3. ✗ 4. ✓

10
1. To tell them to search for food when the food is low.
2. Because they search for food and locate it.
3. To alert them in case of any danger.
4. Because they depend on echolocation and their hearing sense to locate their prey.
5. Because it helps them navigate their surroundings.

6 Because both of them produce high-pitched sounds and receive echo to locate objects.

11
1 Nurse ants send a smelly message to scout ants to alert them to find food.
2 Soldier ants send a smelly message to other ants to alert them.
3 They can't locate their prey.
4 It turns into vibrations that can be felt by the person's thumb.

Concept 3
Lesson 1

1
1 b 2 d 3 c 4 c
5 b 6 d 7 c 8 c
9 a 10 d 11 c 12 b
13 c 14 d

2
1 structural
2 night vision goggles
3 different 4 nervous
5 Light 6 moon 7 more
8 better 9 cats
10 a mirror-like membrane
11 dim light 12 reflection

3
1 ✓ 2 ✗ 3 ✓ 4 ✓
5 ✗ 6 ✗ 7 ✓ 8 ✓
9 ✓ 10 ✓ 11 ✗ 12 ✓
13 ✗

4
1 Cats, humans
2 moon, mirror 3 light, sound
4 eyes, brain

5
1 Nocturnal animals
2 Fishing cats 3 Light
4 Light source
5 Night vision goggles

6
1 Bat 2 Moon

7
(A) 1 c 2 b 3 d 4 a
(B) 1 b 2 c 3 d 4 a
(C) 1 d 2 e 3 a 4 b
5 c

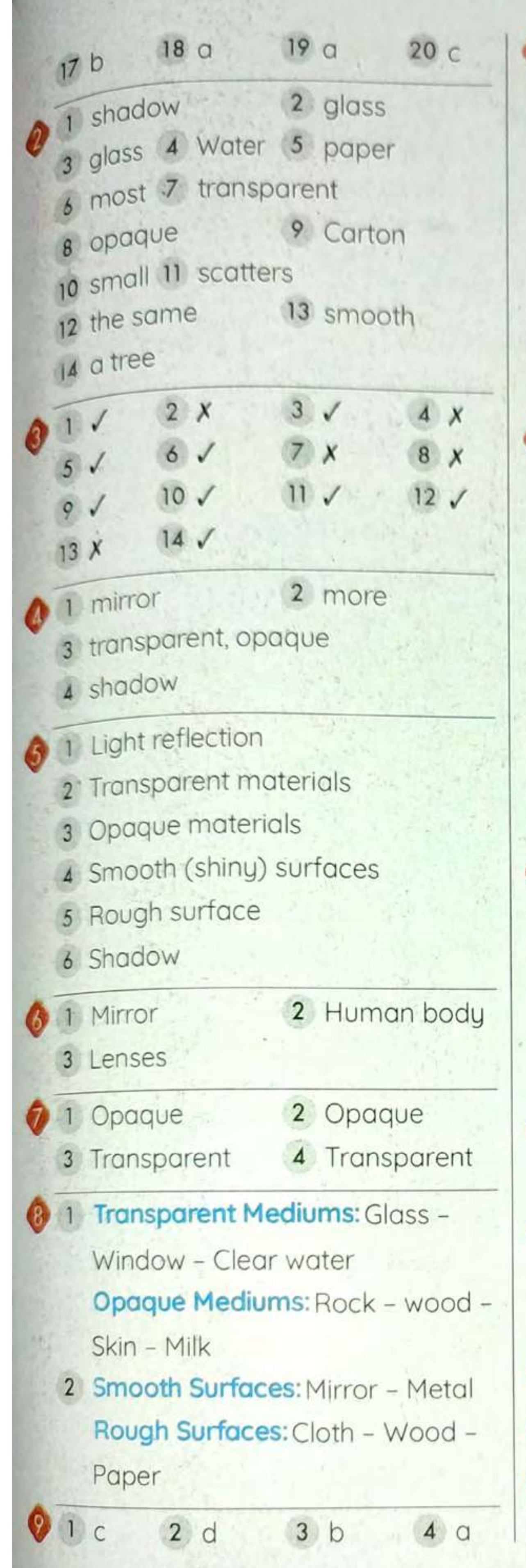
8
1 Figure (3)
2 a. Figure (2), figure (1)
b. Figure (1)

9
1 Because they have bigger eyes and their pupils open wider than humans.
2 Because its eyes have a mirror-like membrane that reflects any light falling on it.
3 Because it doesn't emit its own light, but it reflects the sunlight falling on it.
4 To allow more amount of light to enter the eyes to see well at night.

10
1 It won't see well at night. Or it will have a poor night vision.
2 It is reflected on the eyes causing vision.
3 They will have excellent night vision. Or they will see well at night.

Concept 3
Lesson 2

1
1 d 2 b 3 d 4 b
5 d 6 c 7 b 8 c
9 b 10 c 11 d 12 a
13 c 14 c 15 b 16 d



17 b 18 a 19 a 20 c

2
1 shadow 2 glass
3 glass 4 Water 5 paper
6 most 7 transparent
8 opaque 9 Carton
10 small 11 scatters
12 the same 13 smooth
14 a tree

3
1 ✓ 2 ✗ 3 ✓ 4 ✗
5 ✓ 6 ✓ 7 ✗ 8 ✗
9 ✓ 10 ✓ 11 ✓ 12 ✓
13 ✗ 14 ✓

4
1 mirror 2 more
3 transparent, opaque
4 shadow

5
1 Light reflection
2 Transparent materials
3 Opaque materials
4 Smooth (shiny) surfaces
5 Rough surface
6 Shadow

6
1 Mirror 2 Human body
3 Lenses

7
1 Opaque 2 Opaque
3 Transparent 4 Transparent

8
1 **Transparent Mediums:** Glass – Window – Clear water
Opaque Mediums: Rock – wood – Skin – Milk
2 **Smooth Surfaces:** Mirror – Metal
Rough Surfaces: Cloth – Wood – Paper

9
1 c 2 d 3 b 4 a

10
1 a. opaque b. transparent
2 Figure (B) because wood is a rough surface that scatters the light rays falling on it in many directions.
3 Carton – Cloth – Aluminum foil
4 a. ✗ b. ✓ c. ✓
5 a. opaque
b. a light source, an opaque object

11
1 Because it allows most of the light to pass through.
2 Because it is an opaque object that doesn't allow light to pass through.
3 Because the mirror is a smooth surface that reflects light rays in one direction, but paper is a rough surface that scatters light in many directions.

12
1 They are reflected in one direction.
2 A shadow is formed.

Concept 3
Lesson 3

1
1 c 2 a 3 d 4 c
5 d 6 b 7 c

2
1 chemical 2 winged
3 structural 4 behavioral
5 sight 6 wings, mate

3
1 ✗ 2 ✓ 3 ✗ 4 ✗

4
1 Firefly 2 Human

5
1 Fireflies 2 Animals
3 Echolocation

6 1 c 2 a 3 d 4 b

7 1 (2), (3) 2 (1), (2) 3 (1) 4 (2) 5 (3) 6 (1)

8 1 To warn off a predator or to attract a mate.
2 Because humans can communicate through writing, while animals can't.

9 They change their flash pattern to match that of the nearby fireflies' group.

Concept 3
Lesson 4

1 1 c 2 d 3 b 4 b 5 b 6 d 7 d 8 d 9 c

2 1 Language 2 lighthouse 3 ears 4 codes

3 1 ✓ 2 ✓ 3 ✓ 4 ✗ 5 ✓

4 1 Code 2 Brain 3 Mirror

5 1 Fire alarm 2 Fireflies

6 1 c 2 d 3 a 4 b

7 a. Figure (2) b. Figure (3) c. Figure (1) d. Figure (4)

8 1 To attract rescue helicopters.
2 Because they guide sailors by using flash codes.

9 1 The brain will send a response to your muscles to stop moving.
2 I will know his feelings.

School Book Questions on Unit 1

1 1 b 2 c 3 d 4 c 5 b 6 d

2 1

Inhaled Air	Exhaled Air
Rich in oxygen gas	Rich in carbon dioxide gas and water vapor

2

Structural Adaptation in Fennec Fox	Behavioural Adaptation
- Extra-large ears - Tan fur	- Living in burrows - Panting

3

Communication between Humans	Communication between Animals
- Reading – writing - Cell phone / TV	- Echolocation

3 1 True 2 False 3 False 4 True 5 True 6 True 7 False 8 False 9 False 10 True

4 1 hearing 2 ears – brain 3 digestive – stomach – respiratory

5 1 Because cats are nocturnal animals that have a mirror-like membrane at the back of the eyes that reflects the light that falls on it.
2 Because bats depend on the echolocation property to locate their prey in complete darkness.

Unit 2

Concept 1

Lesson 1

1

1 d	2 d	3 c	4 d
5 c	6 d	7 a	8 c
9 b	10 c	11 b	12 c
13 d	14 b	15 c	

2

1 engines	2 pushing
3 force	4 Pushing
5 more	6 pulling
7 pulling	8 quickly
9 3	10 leaf

3

1 ✓	2 ✗	3 ✓	4 ✓
5 ✓	6 ✗	7 ✓	8 ✓

4

1. static – force – position
2. jet engines – increase
3. rockets – decrease

5

1. Static object
2. Pushing force
3. Pulling force
4. Shockwave truck
5. Parachute

6

1. Time
2. Lift the ball
3. Pulling force
4. Normal trucks

7

1 c	2 a	3 b	4 d

8

(A)
1. 4 – 1
2. 2
3. 2 – 4
4. 2 – 3

(B)
1. Adam
2. longer
3. backward – forward
4. pushing – air
5. faster – longer

9

1. Push
2. Pull
3. Push
4. Pull

10

1. Because a pushing force is moving an object away from you, while a pulling force is pulling an object towards you.
2. Because when the player kicks the ball, the ball moves away from the player.
3. Because a jet airplane has a more powerful engine than a normal truck.
4. Because it is fitted with three jet engines that help it move and reach record speeds by the pushing force of its powerful engines.
5. To help the driver of the Shockwave truck to slow down it quickly.

11

1. The static object will move and change its position.
2. The speed of the Shockwave truck will decrease quickly.
3. The cart will move forward.
4. The cart will move faster and cover a longer distance.

Concept 1

Lesson 2

1

1 d	2 c	3 a	4 d
5 b	6 c	7 a	8 a
9 a	10 d	11 d	

2

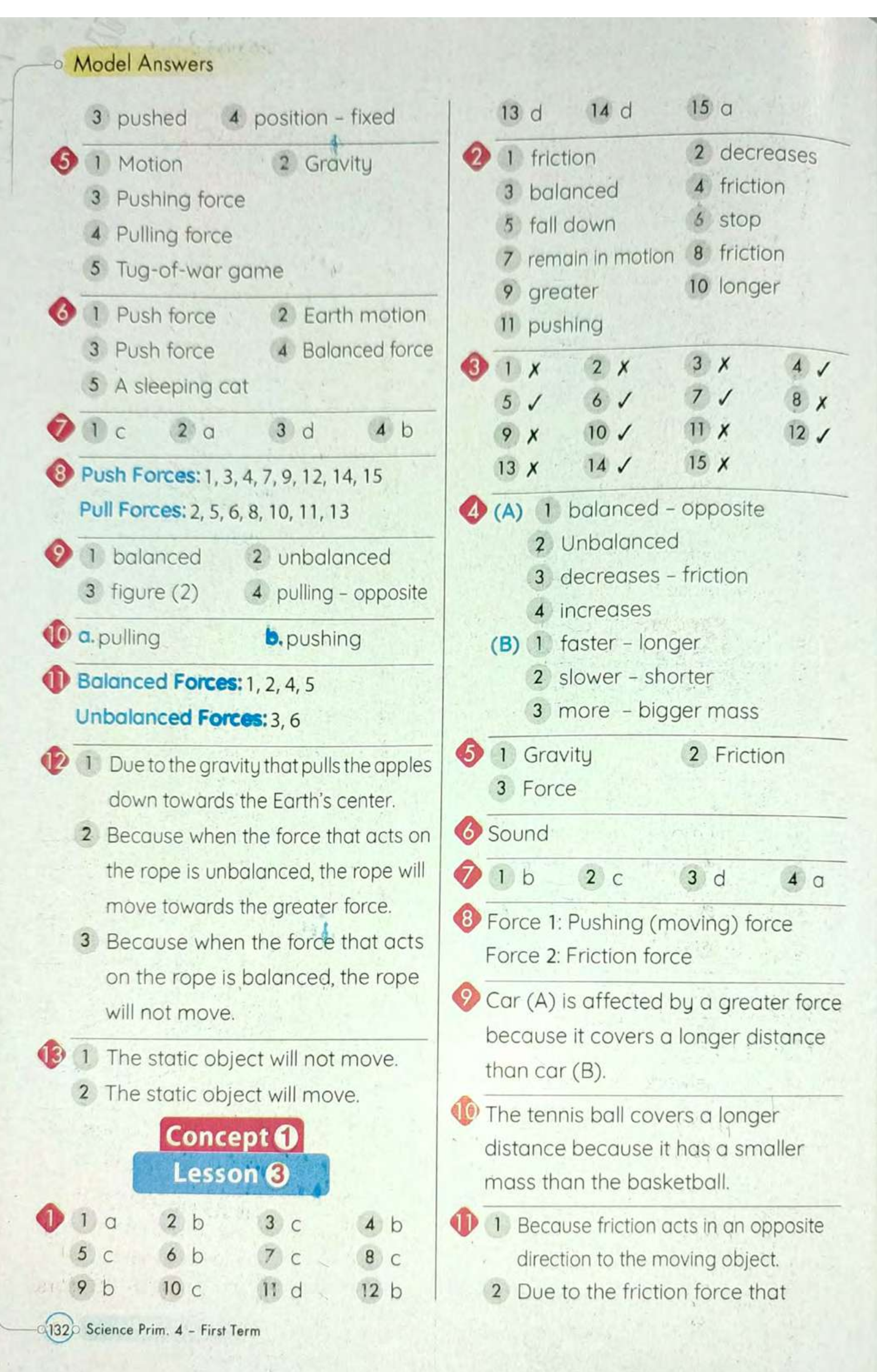
1 unbalanced	2 gravity
3 balanced	4 pulling
5 push	6 greater
7 pushing	8 pushing
9 longer	10 unbalanced

3

1 ✗	2 ✓	3 ✗	4 ✓
5 ✓	6 ✓	7 ✗	8 ✗
9 ✗			

4

1. forward
2. pulls – downward



3 pushed 4 position - fixed

5 1 Motion 2 Gravity
3 Pushing force
4 Pulling force
5 Tug-of-war game

6 1 Push force 2 Earth motion
3 Push force 4 Balanced force
5 A sleeping cat

7 1 c 2 a 3 d 4 b

8 **Push Forces:** 1, 3, 4, 7, 9, 12, 14, 15
Pull Forces: 2, 5, 6, 8, 10, 11, 13

9 1 balanced 2 unbalanced
3 figure (2) 4 pulling - opposite

10 a. pulling b. pushing

11 **Balanced Forces:** 1, 2, 4, 5
Unbalanced Forces: 3, 6

12 1 Due to the gravity that pulls the apples down towards the Earth's center.
2 Because when the force that acts on the rope is unbalanced, the rope will move towards the greater force.
3 Because when the force that acts on the rope is balanced, the rope will not move.

13 1 The static object will not move.
2 The static object will move.

Concept 1
Lesson 3

1 1 a 2 b 3 c 4 b
5 c 6 b 7 c 8 c
9 b 10 c 11 d 12 b
13 d 14 d 15 a

2 1 friction 2 decreases
3 balanced 4 friction
5 fall down 6 stop
7 remain in motion 8 friction
9 greater 10 longer
11 pushing

3 1 ✗ 2 ✗ 3 ✗ 4 ✓
5 ✓ 6 ✓ 7 ✓ 8 ✗
9 ✗ 10 ✓ 11 ✗ 12 ✓
13 ✗ 14 ✓ 15 ✗

4 (A) 1 balanced - opposite
2 Unbalanced
3 decreases - friction
4 increases
(B) 1 faster - longer
2 slower - shorter
3 more - bigger mass

5 1 Gravity 2 Friction
3 Force

6 Sound

7 1 b 2 c 3 d 4 a

8 Force 1: Pushing (moving) force
Force 2: Friction force

9 Car (A) is affected by a greater force because it covers a longer distance than car (B).

10 The tennis ball covers a longer distance because it has a smaller mass than the basketball.

11 1 Because friction acts in an opposite direction to the moving object.
2 Due to the friction force that

slows down the bike speed until it stops.

3 Because the wall acts with the same force on the car and in the opposite direction.

4 Because the speed of the moving object is affected by the force acting on it.

12

1 The speed of the bike will decrease until it stops.

2 The car will stop moving.

3 The toy car will move for a short distance.

4 The kinetic energy of the toy car will increase.

Concept 1
Lesson 4

1

1 b 2 c 3 d 4 a
5 c

2

1 energy 2 Force
3 doesn't move 4 more
5 force 6 work 7 transfer

3

1 ✗ 2 ✓ 3 ✓ 4 ✗
5 ✓ 6 ✗

4

1 Force 2 Work

5

1 d 2 c 3 a 4 b

6

1 Because work is the force applied by the boy to move the car.

2 Because the wall doesn't move.

Concept 2
Lesson 1

1

1 d 2 b 3 c 4 d
5 d 6 b 7 d 8 c
9 d 10 b 11 b 12 d

2

1 potential 2 kinetic
3 less 4 faster
5 Potential energy 6 potential
7 kinetic 8 consumes

3

1 ✗ 2 ✓ 3 ✓ 4 ✓
5 ✓ 6 ✗ 7 ✗ 8 ✗
9 ✓ 10 ✓

4

1 speed – height

2 electrical energy – potential energy – kinetic energy 3 motor

5

1 Potential energy
2 Kinetic energy
3 Kinetic energy
4 Electrical energy
5 Chemical energy

6

1 Object's speed
2 Object's height

7

1 e 2 d 3 b 4 a

8

1 Kinetic energy
2 Potential energy
3 A
4 Electricity – motors

9

1 Because as the height of the object increases, its stored potential energy increases.

2 Because the stored potential energy is converted into kinetic energy.

3 Because electricity helps the cars

of a roller coaster to move up the ramp.

10
1. The stored potential energy will increase.
2. The stored potential energy is converted into kinetic energy.
3. The stored potential energy will be maximum.
4. The roller coaster cars will have no energy.

Concept 2
Lesson 2

1 1 c 2 a 3 a 4 c 5 c 6 a

2 1 potential 2 becomes zero 3 decreases 4 potential

3 1 ✓ 2 ✓ 3 ✗ 4 ✓ 5 ✗ 6 ✗ 7 ✗ 8 ✓

4
1. potential – kinetic
2. decreases – increases
3. Light

5
1. Potential energy
2. Kinetic energy
3. Force
4. Work

6 1 b 2 a 3 c

7 Chemical energy

8
1. potential – kinetic
2. Potential
3. no

9
1. Because the book on the table stores potential energy.
2. Because the stored potential energy is converted into kinetic energy.
3. Because kinetic energy transfers from yor foot to the ball, so it moves.

10
1. The potential energy will increase.
2. The potential energy will decrease.
3. The ball will move as it gains kinetic energy.
4. The potential energy will increase.

Concept 2
Lessons 3 and 4

1 1 a 2 a 3 c 4 d 5 c 6 d 7 c 8 b 9 b 10 c 11 d 12 d 13 c

2
1. chemical
2. Chemical energy
3. washing machine
4. different
5. sound
6. electrical
7. electric lamp

3 1 ✗ 2 ✓ 3 ✓ 4 ✓ 5 ✓ 6 ✗ 7 ✓ 8 ✓ 9 ✓ 10 ✓ 11 ✗

4
1. A gas oven
2. kinetic
3. Sound
4. potential

5
1. gravitational
2. increases – speed
3. potential – kinetic

6
1. Potential energy
2. Kinetic energy
3. Potential energy
4. Electrical energy
5. Light energy
6. Sound energy
7. Gravitational potential energy
8. Electrical energy
9. Radio

7 1 b 2 d 3 a 4 c

8 1 Electric heater 2 Radio

9 1

Tool	Door bell	Hand bell
Energy Used	Electrical energy	Kinetic energy
Energy Produced	Sound energy	Sound energy

2

Tool	Energy Used	Energy Produced
Normal car	Chemical energy	Kinetic energy
A car operated by a remote	Chemical energy	Kinetic energy
A spring-powered car	Potential energy	Kinetic energy

10 **Kinetic Energy:** 1, 3

Potential Energy: 2, 4, 5, 6

11 a. Chemical b. electrical

c. kinetic

12 1 Because electricity is a form of energy that moves in wires.

2 Because the TV produces light and sound energies.

3 Because kinetic energy is converted into thermal energy.

13 1 The electrical energy is converted into light and thermal energies.

2 The electrical energy is converted into kinetic energy.

3 The chemical energy is converted into light and thermal energies.

Concept 3

Lesson 1

1 1 d 2 d 3 c 4 b
5 d 6 d 7 b 8 d
9 b 10 c 11 b 12 c
13 c 14 c

2 1 ✗ 2 ✓ 3 ✗ 4 ✗
5 ✓ 6 ✗ 7 ✓ 8 ✗
9 ✓ 10 ✓ 11 ✗

3 1 Cricket 2 Seatbelt
3 Airbag 4 Wrecking ball
5 Vents (holes)

4 1 less 2 more
3 opposite 4 nylon, steel

5 1 Sound 2 kinetic
3 car 4 gas 5 airbag
6 suddenly 7 deflate
8 automatically 9 airbag
10 quickly 11 energy
12 direction 13 more
14 energy

6 1 Bike 2 Tires

7 1 b, c 2 a, b 3 c, a

8 1 c 2 a 3 d 4 b

9 1 a. A moving train
b. A moving motorbike
c. A moving bike
d. Yes, because any moving object has kinetic energy.

2 a. The car, because it has less mass.
b. The truck

3 a. wooden bat
b. kinetic, bat, ball
c. increases, different

4 airbag and seatbelt

10
1. Because the truck has more mass than the car.
2. Because it has more speed and more kinetic energy.
3. As the seatbelt prevents the passenger from moving forward when the car stops suddenly, and the airbag absorbs the car's energy and slows down the driver's speed during a collision.
4. To slow down the driver's speed and absorb the car's energy during a collision.
5. To let the driver get out of the car.

11
1. The truck causes more damage than the car.
2. Kinetic energy transfers from the bat to the ball causing its speed to increase and move in a different direction.

Concept 3
Lesson 2

1

1 d	2 b	3 d	4 c
5 a	6 b	7 a	8 d
9 d	10 c	11 d	12 c

2

1 ✗	2 ✗	3 ✓	4 ✓
5 ✗	6 ✓	7 ✗	8 ✗

3 1 ÷ 2 increases 3 same

4 1 Speed 2 Speed 3 Second or hour

5 1 speed 2 3 m/s 3 faster 4 longer 5 physical 6 more

6 1 increases 2 less 3 higher

7 1 Direction 2 Kg 3 Meter

8 1 d 2 a 3 b 4 c

9 1 Car (A) 2 Car (B)

10 1 B, D 2 D 3 A, C

11
1. a. slower, decreases
   b. faster, increases
2. Car (B)

12
1. $\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{40}{8}$
   $= 5$ m/sec.
2. $\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{200}{2}$
   $= 100$ km/hr.

13
1. Because the speed is the covered distance by the object in a unit of time.
2. Because some of the kinetic energy is converted into sound and heat energies.
3. As by increasing the speed, kinetic energy increases and the object exerts more force during collision causing more damage.

14
1. Its speed increases.
2. Its speed decreases.
3. Its kinetic energy decreases.

Concept 3
Lesson 3

1

1 d	2 c	3 a	4 c
5 a	6 d	7 d	8 c

2 1 ✗ 2 ✗ 3 ✓ 4 ✗

3 1 kinetic 2 more 3 kinetic

4 1 Collision 2 Mass

5 1 opposite 2 faster

6
1. a. car, traffic lights
   b. truck c. bike
   d. sound energy

2 **Figure (1):** the opposite direction

7
1. It will result in less damage that can be repaired.
2. It will result in a severe damage that can't be repaired.

Concept 3
Lesson 4

1

1 c	2 c	3 c	4 b
5 a	6 b	7 c	8 c
9 c	10 b	11 d	12 c
13 b	14 d		

2

1 ✗	2 ✓	3 ✓	4 ✗
5 ✗	6 ✓	7 ✗	8 ✓
9 ✗	10 ✓	11 ✓	12 ✗

3
1. slower
2. Kinetic
3. more
4. slightly
5. potential, kinetic
6. sound, thermal
7. decrease, stop
8. decreases

4 1 b 2 a 3 c

5
1. Figure (2)
2. Figure (1)
3. Figure (3)
4. figure (3), figure (2)
5. figure (3), figure (1)

6
a. 2 b. 4 c. 1
d. 6 e. 3 f. 5

7
1. Because it exerts more force as it has a bigger engine.
2. Because it has more mass.
3. As part of the kinetic energy changes into sound energy during a collision and some is changed into thermal energy due to the friction between Newton's cradle parts.
4. As energy isn't not destroyed, but it is changed into sound and thermal energies.

8
1. Its kinetic energy increases.
2. Its kinetic energy increases.
3. He will have some injuries and will survive.
4. His life may be in danger.
5. It stores potential energy.
6. Its potential energy changes into kinetic energy.
7. Kinetic energy transfers to the rest of the balls, and the last ball moves.
8. Their kinetic energy decreases gradually until they stop.

School Book Questions on Unit 2

1

1 d	2 c	3 d	4 b
5 b	6 a	7 c	

2
1. **(A)** Unbalanced **(B)** To the left
2. **Car (A):**

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{100}{20} = 5 \text{ m/s.}$$

Car (B):

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{300}{20} = 15 \text{ m/s.}$$

Car (B) has the highest speed.

3. potential - kinetic
4. The truck, because the mass of the truck is bigger than the mass of the car.

3 1 b 2 c 3 e 4 a

Revision Model Answers

Unit 1

Concept 1

1

1 a	2 c	3 b	4 c
5 a	6 b	7 b	8 c
9 b	10 b	11 d	12 d
13 b	14 c	15 d	16 a
17 b	18 c	19 c	20 d
21 b	22 b	23 d	24 a
25 a	26 b	27 c	28 a
29 a	30 b	31 b	

2

1. structural
2. structural
3. cool
4. salt water
5. structural adaptation
6. kapok
7. teeth and tongue
8. Esophagus
9. carbon dioxide
10. digestive
11. respiratory
12. respiration
13. exhalation
14. oxygen
15. Air pollution

3

1 ✓	2 ✓	3 ✗	4 ✗
5 ✗	6 ✗	7 ✓	8 ✓
9 ✗	10 ✓	11 ✗	12 ✗
13 ✓	14 ✓	15 ✓	16 ✓
17 ✗	18 ✗	19 ✓	20 ✓
21 ✗	22 ✓	23 ✗	24 ✗
25 ✗	26 ✓	27 ✗	28 ✓
29 ✗	30 ✗	31 ✗	32 ✓
33 ✗	34 ✗	35 ✗	

4

1. Adaptation
2. Camouflage
3. Structural adaptation
4. Countershading
5. Digestion process
6. Diaphragm
7. Amphibians
8. Gills
9. Alveoli
10. Penguin

5

1. a. water lily b. Respiration
   c. buttress roots
2. a. Fennec foxes
   b. Penguins, Arctic foxes
   c. bull shark

6

(A) 1 d 2 a 3 b 4 c

(B) 1 c 2 e 3 a 4 b 5 d

(C) 1 c 2 b 3 a

(D) 1 c 2 b 3 a 4 d

7

1. Arctic fox
2. Agama lizard
3. Gills
4. saliva

8

1 B	2 B	3 S	4 S
5 S	6 S		

9

1. camouflage
2. a. Inhalation b. Exhalation
   c. It contracts and moves downward.
3. Digestive system
4. to search for insects and look out for enemies at the same time.
5. Cold climate, to keep their bodies warm.
6. absorb a large amount of sunligh
7. cold
8. Panther chameleon, kapok tree

10 To stay warm in cold climate.

11 The chest size increases and oxygen gas enters the lungs.

Concept 2

1

1 d	2 a	3 b	4 c
5 c	6 d	7 a	8 b
9 a	10 d	11 b	12 b
13 d	14 d	15 c	16 a
17 c	18 a	19 c	20 a

2
1 response time
2 jerboa
3 brain
4 hearing
5 nervous
6 Mongooses
7 the sensory organs to the brain
8 hearing sense
9 nervous
10 spinal cord
11 cane
12 Whales
13 mating
14 hearing
15 smelly
16 Ants

3

1 ✓	2 ✓	3 ✗	4 ✗
5 ✗	6 ✗	7 ✗	8 ✓
9 ✓	10 ✓	11 ✗	12 ✓
13 ✗	14 ✗	15 ✗	16 ✓
17 ✓	18 ✓	19 ✓	20 ✓
21 ✗	22 ✓	23 ✗	24 ✓

4
1 Brain
2 Echolocation
3 Nocturnal animals
4 Sensory receptors
5 Reaction time
6 Nervous system
7 Jerboa
8 Scout ants
9 Nurse ants
10 Touch
11 Reflexes (reflex actions)

5
1 Eyes
2 Echolocation
3 Ants

6
(A) 1 b 2 c 3 a
(B) 1 c 2 d 3 e 4 b 5 a

7
1 A reflex action occurs.
2 It can't jump for a long distance and can't escape from its enemies.

8
1 Dolphins use echolocation property, where they produce sound waves that return back to the dolphins' ears when they hit the prey.
2 Structural adaptation

Concept 3

1

1 c	2 d	3 d	4 c
5 b	6 b	7 b	8 a
9 b	10 d	11 b	12 b
13 d	14 c	15 b	16 c
17 c	18 a	19 c	20 d
21 b	22 b		

2
1 wider
2 Fire
3 transparent
4 same
5 opaque
6 Carton
7 rough
8 codes

3

1 ✓	2 ✗	3 ✗	4 ✗
5 ✗	6 ✓	7 ✓	8 ✗
9 ✓	10 ✗	11 ✓	12 ✓
13 ✗	14 ✓	15 ✓	16 ✓
17 ✓	18 ✗	19 ✓	20 ✓
21 ✓			

4
1 Light
2 Eye
3 Light sources
4 Night vision goggles
5 Fishing cat
6 Transparent materials
7 Opaque materials
8 Smooth surfaces
9 Rough surfaces

5
1 Brick
2 Moon
3 Glass cup
4 Mirror

6
1 Opaque
2 Opaque
3 Transparent
4 Transparent

7
1. Rock → Opaque
2. Glass, Window → Transparent

8
1. Mirror, Metal → Smooth materials
2. Cloth, Wood → Rough materials

9
(A) 1. c 2. b 3. d 4. a
(B) 1. c 2. a 3. b
(C) 1. c 2. d 3. a 4. b

10
1. Opaque 2. Transparent

11
Figure (B), because it scatters light rays in different directions.

12
Carton - cloth

13
1. Because it doesn't emit its own light, but it reflects the sunlight falling on it.
2. Because it emits its own light.
3. Because they have bigger eyes and their eyes' pupils open wider than those of the humans eyes.
4. Because they have a mirror-like membrane that reflects any light falling on it.
5. Because humans eyes don't have a mirror-like membrane like that in cats' eyes.
6. Because glass is a transparent object that allows light to pass.
7. Because an opaque object doesn't allow light to pass through.
8. Because opaque objects may absorb or reflect the light falling on them.

14
1. It forms a shadow.
2. Light rays are scattered in different directions.

Unit 2

Concept 1

1
1. d 2. c 3. b 4. a
5. a 6. d 7. d 8. c
9. a 10. b 11. a 12. c
13. b 14. d 15. b

2
1. friction 2. unbalanced
3. gravity 4. balanced
5. 3

3
1. ✓ 2. ✗ 3. ✓ 4. ✗
5. ✓ 6. ✓ 7. ✗ 8. ✓
9. ✗ 10. ✓ 11. ✓

4
1. Gravity 2. Force
3. Friction force

5
1. d 2. c 3. a 4. b

6
Car (A), because it moved a longer distance than car (B).

7
Gravity

8
The bike's speed decreases till it stops.

Concept 2

1
1. d 2. a 3. b 4. d
5. b 6. a 7. c 8. c
9. d 10. a 11. a 12. c

2
1. consumes 2. chemical
3. Chemical energy
4. decreases 5. Gravitational
6. work 7. Energy
8. light 9. potential
10. sound

3
1. ✓ 2. ✓ 3. ✗ 4. ✓
5. ✓ 6. ✗ 7. ✗ 8. ✗
9. ✓ 10. ✓ 11. ✓ 12. ✓
13. ✗ 14. ✓ 15. ✓ 16. ✓

4
1. Kinetic energy 2. Energy
3. Work 4. Kineticenergy

5 Gravitational potential energy

5
1 sound 2 electrical
3 kinetic 4 light
5 chemical 6 light

6
1 b 2 a 3 c

7
1 Chemical energy
2 Light energy 3 Flashlight

Concept 3

1
1 c 2 a 3 b 4 a
5 d 6 a 7 d 8 b
9 c 10 d 11 c 12 c
13 b 14 c 15 c 16 d

2
1 airbag 2 sensors
3 energy 4 direction
5 physical 6 more
7 big engines 8 speed
9 fuel 10 5 km/hr
11 Airbags
12 Distance ÷ Time 13 kinetic
14 potential

3
1 ✓ 2 ✓ 3 ✗ 4 ✓
5 ✗ 6 ✓ 7 ✗ 8 ✗
9 ✗ 10 ✓

4
1 Collision 2 Seatbelt
3 Airbag 4 Wrecking ball

5
1 b 2 c 3 e 4 a
5 d

6
1 Seatbelts and airbags
2 $\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{200}{2}$
$= 100 \text{ km/hr}$
3 $\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{600}{6}$
$= 100 \text{ km/hr}$
4 Car (B)

Government Exams Model Answers

1 Cairo – Official Language Schools

Question 1
(A) 1 c 2 c 3 b 4 a
(B) Car (C)

Question 2
(A) 1 ✗ 2 ✗ 3 ✓ 4 ✗
5 ✓
(B) 1 The moon 2 Fireflies
3 Flashlight

Question 3
(A) 1 c 2 a 3 b
(B) Animals have a super sight sense:
Fishing cat
Animals have a super hearing sense:
Dolphin and bat

2 Cairo – Al-Azhar Al-Sharif

Question 1
1 b 2 a 3 b 4 d

Question 2
1 ✗ 2 ✗ 3 ✓ 4 ✗
5 ✓

Question 3
1 b 2 d 3 c 4 a

3 Giza – Al-Azhar Al-Sharif

Question 1
(A) 1 a structural 2 mammals
3 Eyes and brain 4 Push
5 friction force
(B) 1 Alveoli 2 Touch
3 Gravitational potential energy

Question 2
(A) 1 ✗ 2 ✓ 3 ✓ 4 ✓
5 ✗

(B) 1 Saliva 2 Lungs
3 Dolphins 4 Fireflies
5 Light energy

4 Al Qalyubia

Question 1

(A) 1 c 2 c 3 a

(B) A reflex action occurs, and you move your feet away.

Question 2

(A) 1 ✗ 2 ✓ 3 ✓ 4 ✗

(B) Transparent object

Question 3

(A) 1 light energy 2 decreases
3 hearing 4 flashes of light

(B) Chemical energy

5 Alexandria – Montazah Zone 1

Question 1

(A) 1 a 2 a 3 b 4 b

(B) Stomach

Question 2

(A) 1 b 2 c 3 d 4 a

(B) Scout ants

Question 3

(A) 1 ✓ 2 ✗ 3 ✗ 4 ✓

(B) To blend in with the green leaves and colorful flowers of trees in the rainforest, to hide from its prey or predators.

6 Alexandria – Montazah Zone 2

Question 1

(A) 1 b 2 c 3 a 4 d

(B) Camouflage

Question 2

(A) 1 ✗ 2 ✓ 3 ✗ 4 ✗

(B) Diaphragm

Question 3

(A) 1 b 2 a 3 d 4 c

(B) 3

7 Alexandria – East Zone

Question 1

(A) 1 c 2 c 3 c 4 b

(B) Because opaque objects may reflect most of the falling light and absorb the some of it.

Question 2

(A) 1 ✗ 2 ✓ 3 ✓ 4 ✓

(B) Nurse ants send a smelly message to scout ants to find food.

Question 3

(A) 1 blend in 2 friction
3 potential

(B) Gills

8 Damnhour Governorate

Question 1

(A) 1 b 2 a 3 c

(B) The chest size increases, and oxygen gas enters the body. (Inhalation occurs.)

Question 2

(A) 1 ✗ 2 ✓ 3 ✓

(B) Friction force

Question 3

(A) 1 spinal cord
2 chemical reactions
3 chemical energy 4 sensors

(B) Wood

9 Menofia Governorate

Question 1

(A) 1 echolocation, smelly
2 smell 3 potential, kinetic
4 Airbags, seatbelts

(B) Speed = Distance ÷ Time = 400 ÷ 2
= 200 km/hr.

Question 2

(A) 1 b 2 b 3 b

(B) Because the lenses are transparent materials that allow light to pass through.

Question 3

(A) 1 ✗ 2 ✓ 3 ✓ 4 ✗

(B) It can't hop for long distances, so it can't escape from its enemies.

10 Kafr El-Sheikh Governorate

Question 1

(A) 1 b 2 b

(B) The bike's speed decreases till it stops.

Question 2

(A) 1 ✗ 2 ✗ 3 ✓ 4 ✓

(B) Reaction time

Question 3

(A) 1 head 2 producing light
3 truck 4 sound

(B) Lungs

11 Mansoura Governorate – Model (A)

Question 1

(A) 1 codes 2 150 cm
3 Camouflage 4 heart

(B) Potential energy

Question 2

(A) 1 ✗ 2 ✓ 3 ✓ 4 ✗

(B) Because their eyes have a mirror-like membrane that reflects any light falling on them.

Question 3

(A) 1 increases
2 Airbag, (seatbelt)
3 Energy 4 light

(B) Figure (A) is an opaque object.
Figure (B) is a transparent object.

12 Mansoura Governorate – Model (B)

Question 1

1 brain 2 Metals
3 Gravity
4 kinetic energy of the object increases
5 the echo

Question 2

1 ✓ 2 ✗ 3 ✓ 4 ✗
5 ✗

Question 3

1 c 2 d 3 e 4 a
5 b

13 Fayoum Governorate

Question 1

(A) 1 b 2 a 3 c 4 a

(B) a mirror-like membrane

Question 2

(A) 1 ✗ 2 ✓ 3 ✗ 4 ✓

(B) Brain

Question 3

(A) 1 c 2 d 3 a 4 b

(B) Figure (A) is an opaque object.
Figure (B) is a transparent object.

14 Dakahlia Governorate

Question 1

(A) 1 a 2 a 3 b 4 a

(B) To hide among the colorful rocks.

Question 2

(A) 1 ✓ 2 ✓ 3 ✓ 4 ✗

(B) They can't locate their preys at dark.

Question 3

(A) 1 c 2 b 3 a

(B) 1 brain 2 structural

(C) Speed = Distance ÷ Time = 500 ÷ 5
= 100 km/hr.

15 Beni Suif Governorate

Question 1

(A) 1 inhalation 2 pitch
3 digestive 4 potential

(B) Behavioral

Question 2

(A) 1 sharp spines 2 Carton
3 Gravity 4 brain

(B) It will not move.

Question 3

(A) 1 ✓ 2 ✗ 3 ✓

(B) Energy

16 Port Said Governorate

Question 1

(A) 1 b 2 d 3 c 4 b

(B) Echolocation

Question 2

(A) 1 ✗ 2 ✓ 3 ✗ 4 ✓

(B) An owl

Question 3

(A) 1 kapok 2 digestive
3 Airbag 4 kinetic

(B) Structural adaptation

17 Ismailia Governorate

Question 1

(A) 1 short 2 nervous
3 gravity 4 light

(B) To jump for long distances to escape from its enemies.

Question 2

(A) 1 Transparent materials
2 Collision 3 Adaptations
4 Friction force

(B) A shadow is formed.

Question 3

(A) 1 d 2 a 3 a 4 b

(B) Bull sharks

18 Red Sea Governorate

Question 1

(A) 1 gills 2 Carton paper
3 heart 4 gravity

(B) Because they have a mirror-like membrane at the back of their eyes that reflects the light falling on it.

Question 2

(A) 1 eye 2 kinetic
3 esophagus 4 light

(B) It is reflected in the same direction.

Question 3

(A) 1 ✗ 2 ✓ 3 ✓ 4 ✗

(B) Structural adaptation

19 Sohag – Al-Azhar Al-Sharif

Question 1

(A) 1 b 2 d 3 a

(B) 1 ✗ 2 ✓ 3 ✓

Question 2

(A) 1 colored scales 2 whale
3 structural

(B) 1 brain 2 Gravity
3 Transparent

Question 3

1 c 2 a 3 b

20 Assuit

Question 1

(A) 1 long and thick 2 nervous
3 gravity 4 potential

(B) Behavioral adaptation

Question 2

(A) 1 ✗ 2 ✗ 3 ✓ 4 ✗

(B) Transparent object

Question 3

(A) 1 exhalation 2 unbalanced
3 hearing

(B) Agama lizard

Model Exam 1

1 Choose the correct answer:

1. In order for the human being to remain alive, there must an integration between the senses and the .... system interact with the surrounding environment.
   a. digestive
   b. respiratory
   c. nervous
   d. circulatory

2. .... pant to lower their body temperature.
   a. Whales
   b. Bats
   c. Lions
   d. Foxes

3. When the driver stops suddenly, all the passengers will move ....
   a. upward
   b. forward
   c. backward
   d. downward

4. Each of the following is considered a source of light, except ....
   a. the fire
   b. the sun
   c. the lamp
   d. the moon

5. Raising the thumb up and lowering it down are kinds of ....
   a. colors
   b. codes
   c. waves
   d. lights

Put (✓) or (✗):

1. The respiratory system is responsible for the entry of air rich in oxygen gas into the body. (
2. Foxes have a strong sense of hearing. (
3. The moon is a source of light. (

4. Red and green traffic lights are codes. ( )
5. The driver should drive as fast as possible to avoid accidents. ( )

3 Calculate the speed of a train that covers 600 km in a time of 6 hours.

....

....

....

4 Which of the following surfaces represents the reflection of light rays from a wooden spoon and why?

(A)

(B)

....

....

....

Model Exam 2

Choose the correct answer:

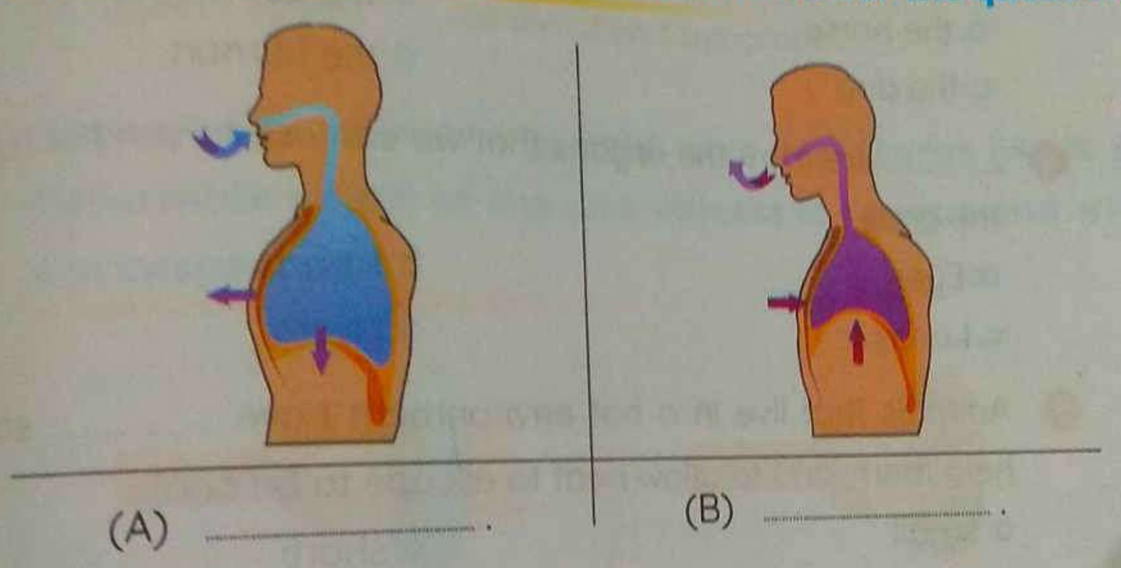
1. ________ energy affects the sensory receptors in the eye causing vision.
   a. Sound b. Kinetic
   c. Light d. Magnetic
2. The eye sends messages to the ________ through the nerves.
   a. spinal cord b. heart
   c. lungs d. brain
3. ________ cover(s) body of an Arctic fox.
   a. Thick fur b. Heavy hair
   c. Heavy skin d. Many feathers
4. Animals can communicate with each other by ________.
   a. talking b. sound
   c. writing d. reading
5. Moving a box away from you represents ________ force.
   a. magnetic b. gravitational
   c. pulling d. pushing

Put (✓) or (✗):

1. The feet of a penguin do not freeze because they have a layer of fat. ( )
2. Bats use their sense of hearing to avoid danger. ( )
3. Wood is a transparent object that allows light to pass through. ( )
4. Bees can know the sweet taste by their sense of smell. ( )
5. The airbag deflates at the same speed as it is inflated. ( )

3 If the two cars moved at the same time for 20 seconds, car (A) covered a distance of 200 meters, while car (B) covered a distance of 300 meters. Which of the two cars has a higher speed?

4 Label the following two processes, then answer the questions:



(A) .... (B) ....

1 What happens to the diaphragm in figure (A)?

2 What happens to the chest size in figure (B)?

Model Exam 3

1 Choose the correct answer:

1. The skin is an important organ of the ________ system.
   a. digestive
   b. nervous
   c. respiratory
   d. circulatory
2. The pushing and pulling forces are different in ________.
   a. mass
   b. color
   c. direction
   d. energy
3. There is a tapetum lucidum in all of the following, except ________
   a. the horse
   b. the cat
   c. the dog
   d. the human
4. ________ are from the organs that we can use to send or recei[ve] the code.
   a. Eyes
   b. Hearts
   c. Lungs
   d. Livers
5. Animals that live in a hot environment have ________ ears t[o] help them, and to allow heat to escape to be cool.
   a. small
   b. short
   c. long
   d. sharp

Put (✓) or (✗):

1. During running and making an effort, the number of breathin[g] times decreases. (
2. Dolphins have a strong sense of hearing. (
3. Humans have a tapetum lucidum in their eyes to help them see at night. (

4. Speed is the distance covered by an object multiplied by the time taken. ( )

5. The seatbelt is used to decrease the speed of the driver when he/she moves forward. ( )

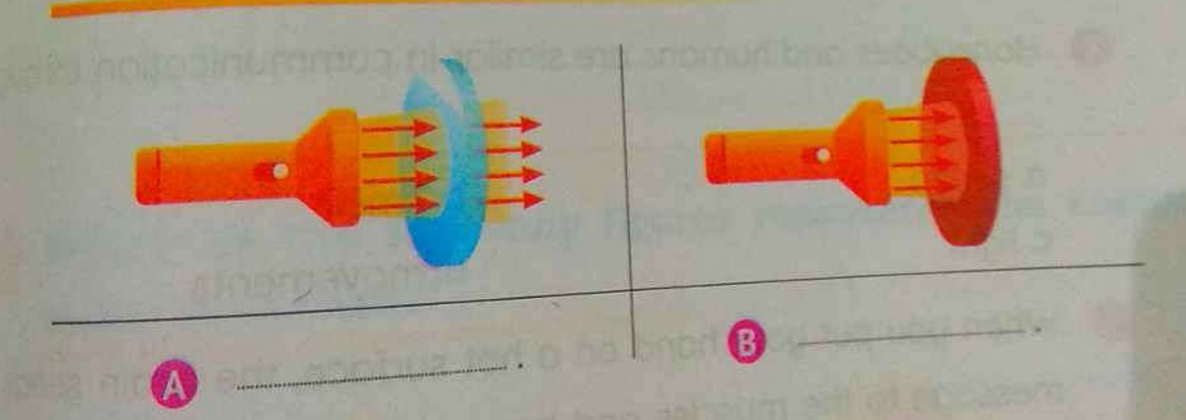
3 Study the following figure, then choose the correct word:

(faster - slower - increases - decreases - remains constant)

a. By using a smaller ball on the same ramp, the object's speed .... as the object becomes ....

b. By increasing the number of books, the object's speed .... as the object becomes ....

4 Look at the path of the light rays in pictures (A) & (B). Determine which of the two objects is opaque and which is transparent:



A ....

B ....

Model Exam 4

1 Choose the correct answer:

1. Fish extract oxygen out of the water using their ______.
   a. skin b. gills
   c. lungs d. fins

2. Which of the following allows light to pass through it?
   a. A rock b. The moon
   c. Wood d. Glass

3. .... make the airbag inflate and fill with gas to pro[vide] a soft cushion.
   a. Brakes
   b. Gas pedals
   c. Sensors
   d. Speedometers

4. Honeybees and humans are similar in communication throu[gh] ....
   a. sound b. smell
   c. light d. movements

5. When you put your hand on a hot surface, the brain sends message to the muscles and the action that comes from y[ou] immediately after it is to ______ .
   a. keep placing your hand
   b. feel pain
   c. pull your hand away from the hot object
   d. do nothing

Put (✓) or (✗):

1. The migration of birds to search for food is considered a form of structural adaptation. ( )
2. Nocturnal animals have eyes that are larger than the humans' eyes. ( )
3. If I can see my face clearly on a surface, this means that it is a smooth, shiny surface. ( )
4. A static object has no kinetic energy until unbalanced forces act on it. ( )
5. The apple on the ground has no energy. ( )

A yellow car moves 10 meters in 5 seconds
A green car moves 20 meters in 5 seconds
What are the speeds of the two cars and which car is faster?

....

....

....

4 Which of the following figures represents the correct vision in humans?

Figure (1)

Figure (2)

Model Exam 5

1 Choose the correct answer:

1. The echo sound feature depends on the ________.
   a. sight sense b. hearing sense
   c. taste sense d. touch sense
2. A static ball on the ________ has no energy.
   a. ramp b. table
   c. ground d. chair
3. A surface that reflects light rays in the same direction is ________
   a. smooth and shiny b. dark with impurities
   c. transparent and clean d. rough and dark
4. Humpback whales use singing for ________.
   a. heating b. hiding from enemies
   c. communication d. having fun
5. Adaptation includes changes that ________ in the environme
   a. reduce chances of survival
   b. improve species survival
   c. reduce life span for individuals
   d. reduce reproduction process

Put (✓) or (✗):

1. Plants have two types of adaptation, structural and behavio (
2. Animals can use more than one sense to communicate with each other. (
3. All nocturnal animals need a source of light to see. (

4. A static object at the top of a ramp has no kinetic energy. ( )
5. Force affects an object and changes work into energy. ( )

3 From the following figure, calculate the speed of the solar vehicle:

00:20

Time: 20 seconds

1200 meters

....

....

....

4 Classify the following words in the table:

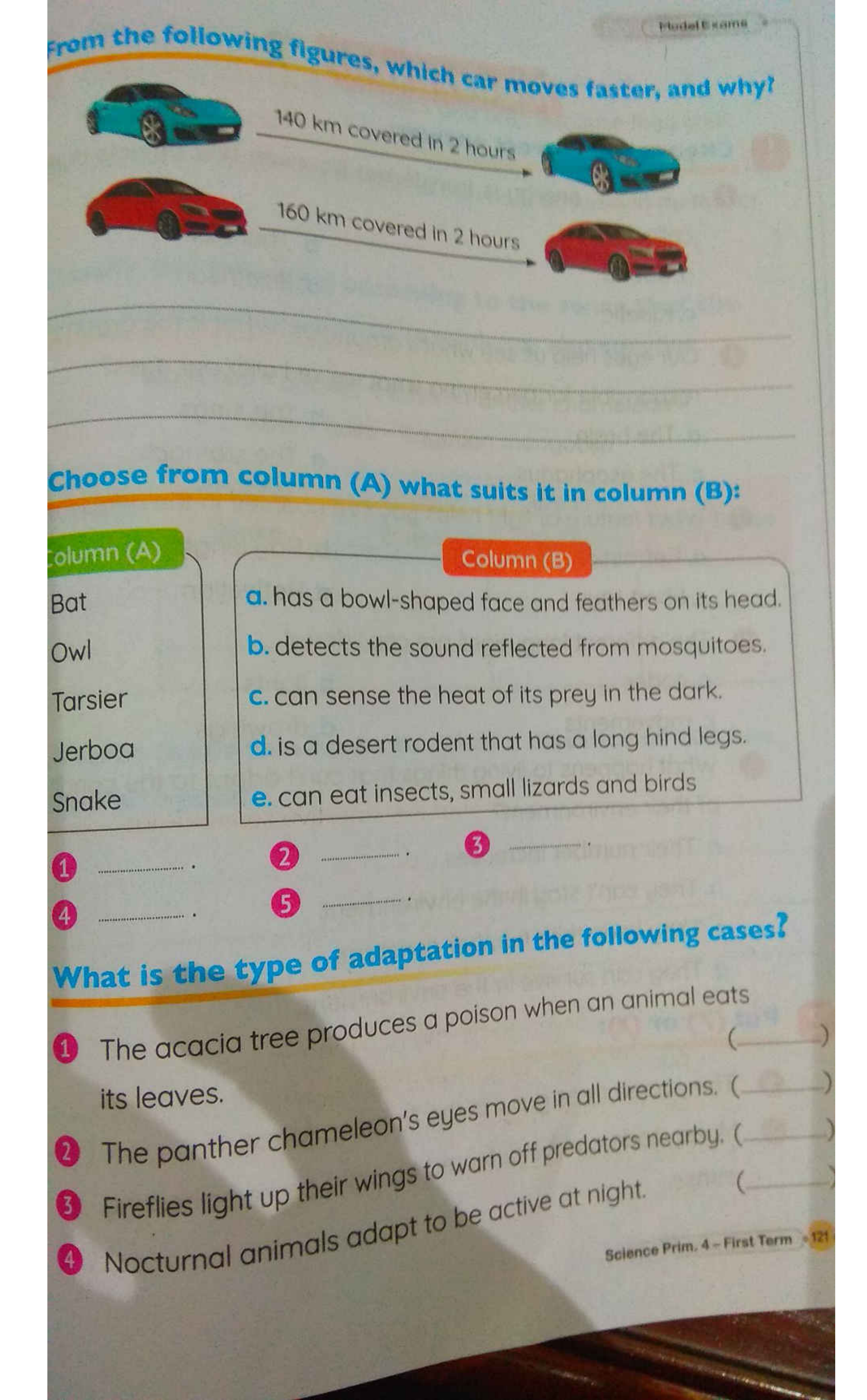
Lungs – Tongue – Nose – Anus – Brain – Alveoli – Liver – Nerves – Stomach – Spinal cord – Small intestine

Digestive System	Respiratory System	Nervous System
....	....	....
....	....	....
....	....	....
....	....	....

Model Exam 6

1 Choose the correct answer:

1. The dolphin can locate its prey through its sense of ______
   a. smell
   b. hearing
   c. sight
   d. taste
2. Which of the following is a source of light?
   a. The eye
   b. The moon
   c. Fire
   d. A mirror
3. Animals can communicate with each other through ______
   a. sounds and lights
   b. talking
   c. reading
   d. writing
4. The stomach is a part of the digestive system that ______
   a. chews food
   b. converts solid food into liquid
   c. absorbs nutrients from food
   d. delivers food into the esophagus
5. In the tug-of-war game, the two teams ______.
   a. push the rope in the same direction
   b. pull the rope in opposite directions
   c. push the rope in opposite directions
   d. pull the rope in the same direction



From the following figures, which car moves faster, and why?

....

....

....

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
Bat	a. has a bowl-shaped face and feathers on its head.
Owl	b. detects the sound reflected from mosquitoes.
Tarsier	c. can sense the heat of its prey in the dark.
Jerboa	d. is a desert rodent that has a long hind legs.
Snake	e. can eat insects, small lizards and birds

1 .... 2 .... 3 ....

4 .... 5 ....

What is the type of adaptation in the following cases?

1. The acacia tree produces a poison when an animal eats its leaves. (............)
2. The panther chameleon's eyes move in all directions. (............)
3. Fireflies light up their wings to warn off predators nearby. (............)
4. Nocturnal animals adapt to be active at night. (............)

Model Exam 7

1 Choose the correct answer:

1. ______ energy is transferred between two objects during collision.
   - a. Sound
   - b. Thermal
   - c. Kinetic
   - d. Electrical
2. Our eyes help us see what's around us. What is the organ that responsible for perceiving what we see with our eyes?
   - a. The brain
   - b. The lungs
   - c. The esophagus
   - d. The stomach
3. What feature of light helps you see yourself in the mirror?
   - a. Refraction
   - b. Ray length
   - c. Short rays
   - d. Reflection
4. The different languages are considered ______ .
   - a. codes
   - b. lights
   - c. movements
   - d. drawings
5. What happens to living things that can't adapt to the conditions of their environment?
   - a. Their number increases.
   - b. They can't stay in the environment.
   - c. They keep their number constant.
   - d. They can survive in the environment.

Put (✓) or (X):

1. The acacia trees grow in the Amazon forest. ( )
2. Morse code can be detected by sight sense or hearing sense. ( )

3. Some animals can see at night, such as a wild cat. (   )
4. Codes are very useful for bees and ants because they can't talk like humans. (   )
5. Distance covered by an object can be measured in meters or kilograms. (   )

3 Classify the following according to the sense that the living organism uses to communicate and survive:

Dolphins – Snakes – Bees – Panther chameleon – Ants – Bats – Egyptian mongoose

Movement	Hearing Sense	Smell Sense	Touch Sense	Taste Sense
....	....	....	....	....
....	....	....	....	....

4 A train takes five hours to cover a distance of 200 km. Find its speed.

....

....

....

Model Exam 8

Choose the correct answer:

1. Humpback whales communicate with each other through the sense of ....
   a. sight
   b. hearing
   c. smell
   d. touch

2. An object's mass affects its ....
   a. potential energy only
   b. kinetic energy only
   c. both kinetic and potential energies
   d. neither kinetic nor potential energies

3. The roots of the palm plants help them to ....
   a. stand strong against the wind
   b. reach the underground soil
   c. fix the plants in the soil
   d. all the previous

4. The .... is an animal that can escape from enemies because of the length of its hind legs.
   a. Arctic fox
   b. jerboa
   c. penguin
   d. panther chameleon

Adel wanted to make a suitable box through which he could see what was inside without having to open it. What material should be used?
   a. Wood
   b. A mirror
   c. Carton
   d. Glass

2 Put (✓) or (X):

1. Man cannot restore the ecosystem in any way. ( )
2. Food turns from complex to simple during digestion. ( )
3. The brain translates the code after receiving it. ( )
4. The object that takes the longest time on the ramp has the biggest mass. ( )
5. Moving an object toward you is considered a pushing force. ( )

3 Classify the following words in the table:

Mirror – Wood – Glass – Metal – Plastic

Shiny Surfaces	Rough Surfaces	Transparent Surfaces
....	....	....
....	....	....
....	....	....

4 Choose from column (A) what suits it in both columns (B) & (C):

Column (A)	Column (B)	Column (C)
Living Organisms	Way of Communication	Depend on
1 Humans	a. use echolocation.	a. light energy only.
2 Fireflies	b. use Morse code.	b. sound energy only.
3 Bats	c. flash their wings.	c. sound and light energies

1 .... 2 .... 3 ....

Model Exam 9

1 Choose the correct answer:

1. The rope in the tug-of-war game moves when the forces acting on it are ______ .
   a. equal b. balanced
   c. unbalanced d. equal zero
2. Which of these is an example of camouflage?
   a. Camel's broad feet
   b. Camel's hump
   c. Powerful parrot wings
   d. The fox is golden like its environment.
3. Traffic lights depend on the sense of sight in communication as ______ .
   a. fireflies b. dolphins
   c. ants d. bats
4. When light is reflected off a surface in different directions, this surface is ______ .
   a. transparent b. smooth
   c. rough d. opaque
5. Sameh drives his bike, and while he hears a car behind him, he turns away so as not to hit it. The system that received a signal making Sameh realize that is ______ .
   a. the nervous system b. the respiratory system
   c. the digestive system d. the circulatory system

ut (✓) or (✗):

The fur that some animals possess to protect them from the cold is a behavioral adaptation. ( )

2. The brain is responsible for processing information. ( )
3. The goalkeeper catches the ball by the pushing force of his hands. ( )
4. Humpback whales change their sound pitch according to the seasons. ( )
5. The object that covers the same distance in a longer time, its speed increases ( )

3 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Light	a. depends on the body's sense of heat for predation.
2 An owl	b. depends on the echo of the sound in locating the prey.
3 A snake	c. is an animal with a bowl-shaped face.
4 A bat	d. it is the visible form of energy that is transmitted in the form of waves.
5 Mirror-like membrane	e. a structural adaptation in the eye that provides some animals with better vision at night
	f. a sense that helps us hear birds.

1 ______ . 2 ______ . 3 ______ .

4 ______ . 5 ______ .

4 Study the following figure, then answer the questions:

1. What does the following figure represent? ______
2. Does this system exist in humans only? ______
3. Label the following:

1 ______

2 ______

3 ______

Model Exam 10

1 Choose the correct answer:

1. One of the adaptations that help an animal protect itself from enemies is ....
   a. blending in b. extinction
   c. immigration d. reproduction
2. .... is from the opaque objects.
   a. Glass b. Carton
   c. Plastic d. Air
3. The .... system helps us to translate messages that come from our surroundings, such as smells and sounds.
   a. respiratory b. digestive
   c. circulatory d. nervous
4. Sending smelly messages when there is a shortage of food is the function of ....
   a. queen ants b. nurse ants
   c. scout ants d. solider ants
5. To calculate the speed of the runner, we use the rule: ....
   a. Speed = distance – time b. Speed = distance × time
   c. Speed = distance ÷ time d. Speed = distance + time

Put (✓) or (✗):

1. Some animals that live in the cold have long ears to help them to maintain their body temperature. ( )
2. The nervous system works separately from the five senses. ( )

3. Gravitational force is an upwards pulling force. ( )
4. The sun is a natural source of light. ( )
5. When you kick a ball, kinetic energy is produced. ( )

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. The spinal cord	a. it is similar in its processing of information to a computer.
2. Using the sense of sight	b. when a foreign object is brought into your eyes.
3. The brain	c. when an object falls from your hands.
4. The reflex occurs	d. the transmission of commands to the muscles to contract.

1. .... 2. .... 3. .... 4. ....

Omar rode his bike 15 kilometers in 3 hours, how fast was he going? Rashida rode her bike 30 kilometers in 2 hours, how fast was she going? Which rider is the fastest? And why?

....

....

....

Model Exam 11

1 Choose the correct answer:

1. Cats' eyes are adapted to night vision due to the presence of the .... behind their eyes.
   a. wide eyes
   b. eye pupil
   c. tapetum lucidum
   d. eye lens

2. Kinetic energy is the energy gained by an object due to its ....
   a. position
   b. shape
   c. motion
   d. size

3. What carries the message from your eyes to your brain when you see something?
   a. Nerves
   b. Muscles
   c. Veins
   d. Glands

4. A blind person's cane and .... emit high-pitched sounds that bounce off form echo.
   a. lizards
   b. bats
   c. bull sharks
   d. polar bears

5. What is adaptation?
   a. The process by which new species appear.
   b. A form of pollination for trees.
   c. A feature owned by living things to help them survive.
   d. A process of getting rid of harmful substances in living things

Put (✓) or (✗):

1. Animals digging trenches is a form of structural adaptation. ( )
2. Reflex is the time taken for the body to receive information from the environment. ( )
3. All objects around us move at different speeds. ( )
4. Long beeps in Morse code are represented by dots. ( )
5. Food stays in the stomach for a few minutes. ( )

Complete using the following words:

(Penguins - Owls - Bats - Bull Sharks - Fennec foxes - Polar foxes - Panther chameleons)

1. .... pant to lower their bodies temperature.
2. .... are from the nocturnal animals that have poor night vision.
3. .... have the ability to rotate their heads in all directions, and it is called super sensory adaptation.
4. .... can sneak up on its prey using countershading.

Arrange the following steps that represent the vision process:

(........) Brain translates these signals.

(........) Eye pupils allow the light to enter the eyes.

(........) Light falls on objects.

(........) Sensory receptors at the back of the eyes send signals to the brain.

(........) Light reflects on the eyes.

Model Exam 12

Choose the correct answer:

1. .... is the force that attracts objects toward Earth's surface.
   a. Magnetic energy b. Electrical energy
   c. Friction force d. Gravity
2. The light-reflecting materials include ....
   a. wood b. mirrors
   c. plastic d. paper
3. To communicate through the sense of sight, we need ....
   a. to make sound b. light
   c. to hear music d. to touch something
4. The eagle is a bird that eats the meat of its prey. Its beak is strong and sharp. This structural adaptation helps it to ....
   a. see b. find a shelter
   c. rip meat d. escape
5. Songs of humpback whales in winter are characterized by ....
   a. high-pitched sounds
   b. low-pitched sounds
   c. rough sounds
   d. weak sounds

...ut (✓) or (✗):

Bats use light as a means of communication with each other. ( )

The spinal cord is an important organ of the digestive system. ( )

Fish have gills to expel oxygen underwater. ( )

4. When a moving bike hits a man, he may be injured only and survive. ( )

5. Digestion of food begins in the mouth. ( )

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Carbon dioxide	a. is a common organ in the digestive and respiratory systems.
2 Diaphragm	b. is a gas necessary for respiration.
3 Throat (pharynx)	c. is a muscle that has an important role in the breathing process.
4 Oxygen	d. is a gas produced by respiration.

1 .... 2 .... 3 .... 4 ....

Study the following table, then complete:

	Car (A)	Car (B)	Car (C)
Distance (Meters)	200	200	100
Time (Seconds)	4	2	2

....

....

....

a. Car (..........) is the fastest one.

b. Cars (..........) and (..........) move with the same speed.

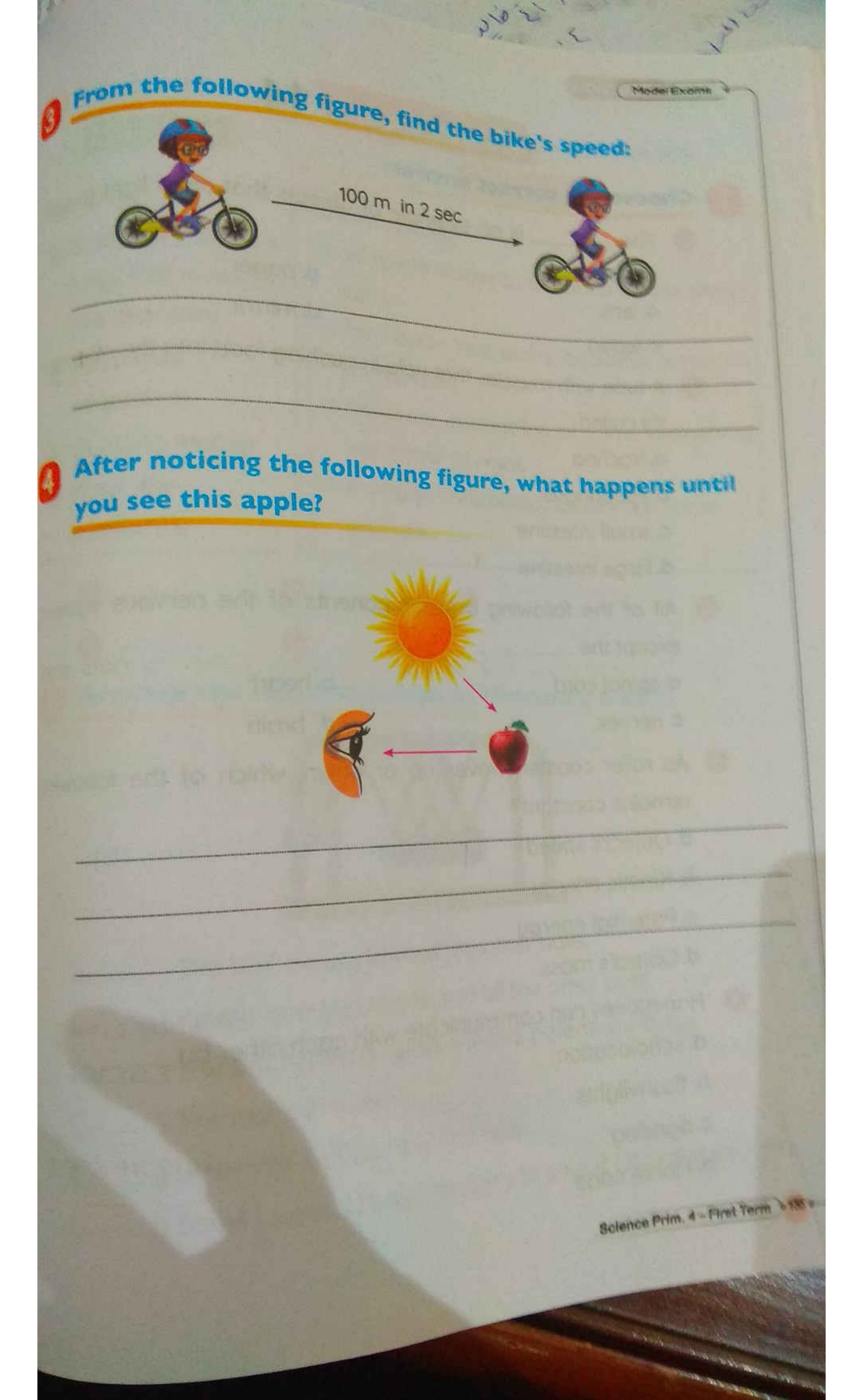
Choose the correct answer:

1. .... mix(es) and grind(s) food inside the mouth.
   a. Teeth only b. Tongue only
   c. Saliva only d. Teeth and tongue
2. As the angle of the inclined ramp decreases, the object's speed ....
   a. increases b. decreases
   c. remains constant d. becomes zero
3. When light falls on a dark surface, ...
   a. the surface absorbs the light b. light passes through it
   c. the light is refracted d. nothing happens
4. The bat is considered a .... animal.
   a. nocturnal b. morning
   c. harmful d. non-flying
5. Morse code consists of .... beeps known as dots and .... beeps known as dashes.
   a. short - short b. long - long
   c. short - long d. long - short

Choose from column (A) what suits it in column (B):

olumn (A)	Column (B)
ght	a. it does not absorb food.
amouflage	b. a type of adaptation that helps animals to hide.
ophagus	c. ants use it to sense and communicate smells.
aphragm	d. it helps us see.
nell	e. a muscle that plays an important role in breathing.

.... 2 .... 3 .... 4 .... 5 ....



3 From the following figure, find the bike's speed:

____

____

____

4 After noticing the following figure, what happens until you see this apple?

____

____

____

Model Exam 14

Choose the correct answer:

1. The .... is an example of objects that allow light to pass through.

   a. lens
   b. paper
   c. wood
   d. mirror

2. A tube with muscles that help in pushing food into the stomach it's called ....

   a. trachea
   b. esophagus
   c. small intestine
   d. large intestine

3. All of the following are components of the nervous system except the ....

   a. spinal cord
   b. heart
   c. nerves
   d. brain

As roller coaster moves up or down, which of the following remains constant?

a. Object's speed
b. Kinetic energy
c. Potential energy
d. Object's mass

Honeybees can communicate with each other by ....

a. echolocation
b. flashvlights
c. dancing
d. Morse code

2 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Nerves	a. bronchioles
2 Branches inside the lungs that resemble tree branches	b. carry messages to the brain via the spinal cord.
3 Behavioral adaptation	c. the kapok tree emits beautiful scents to attract bats.
4 Vibrating motion	d. structural adaptation of some animals to see better at night.
5 Mirror-like membrane	e. a way to communicate between some animals

1 .... 2 .... 3 ....

4 .... 5 ....

Arrange the following steps in Newton's cradle:

(........) The ball moves toward the other balls.

(........) Kinetic energy transfers to all the other balls.

(........) The ball is raised up so it stores potential energy.

(........) The last ball moves.

(........) When the ball hits the first ball.

(........) Some kinetic energy changes to sound and heat energies.

Model Exam 15

hoose the correct answer:

We can say an object is in a state of motion when its .... changes

a. shape

b. size

c. color

d. position

When your eyes see a red traffic light, it sends a signal to you to ....

a. increase the speed

b. decrease the speed

c. keep your speed

d. start moving

.... puff up (blow) their bodies with the air to scare their enemies.

a. Bull sharks

b. Panther chameleons

c. Snakes

d. Jerboas

When light strikes an opaque object, ...

a. light reflects

b. light refracts

c. shadow is formed

d. light passes through it

.... have the ability to turn their heads in all directions.

a. Snakes

b. Jerboas

c. Dolphins

d. Owls

2 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Kilometer	a. it is the change in an object's position.
2 Respiration	b. it is the visible form of energy that is transmitted in the form of waves.
3 Energy	c. the force that pulls things downwards.
4 Gravity	d. the process of pushing air in and out of the body.
5 Motion	e. a measuring unit for long distances
6 Light	f. it is the ability to do work

1 .... 2 .... 3 ....

4 .... 5 .... 6 ....

3 Answer the following questions:

1. A dolphin can locate living organisms and things under the surface of the water. Explain the feature that helps the dolphin to do so.

....

....

2. There are some nocturnal animals that depend on their sharp senses to get their prey, give examples.

....

....

3. Snakes depend on identifying their prey and catching them at night by sensing heat. Determine the reason.

....

....

Model Exams

Model Exam 1

1 Choose the correct answer:

1 c 2 d 3 b 4 d 5 b

2 Put (✓) or (✗):

1 ✓ 2 ✓ 3 ✗ 4 ✓ 5 ✗

3 Speed = distance ÷ time = 600 ÷ 6
= 100 km/hr.

4 Which of the following surfaces represents the reflection of light rays from a wooden spoon and why?

(B), because light rays reflect in different directions when they fall on a rough surface.

Model Exam 2

1 Choose the correct answer:

1 c 2 d 3 a 4 b 5 d

2 Put (✓) or (✗):

1 ✗ 2 ✓ 3 ✗ 4 ✗ 5 ✓

3 Car (B) has higher speed because it covers a longer distance at the same time.

4 Label the following two processes, then answer the questions:

(A): inhalation (B): exhalation

1 It contracts and moves down.

2 It decreases.

Model Exam 3

1 Choose the correct answer:

1 b 2 c 3 d 4 a 5 c

2 Put (✓) or (✗):

1 ✗ 2 ✓ 3 ✗ 4 ✗ 5 ✗

3 Study the following figure, then choose the correct word:

(a) decreases - slower

(b) increases - faster

4 A Transparent B Opaque

Model Exam 4

1 Choose the correct answer:

1 b 2 d 3 c 4 d 5 c

2 Put (✓) or (✗):

1 ✗ 2 ✓ 3 ✓ 4 ✓ 5 ✗

3 Speed of the yellow car
= distance ÷ time = 10 ÷ 5 = 2 m/sec

Speed of the green car = distance ÷ time
= 20 ÷ 5 = 4 m/sec.

The green car is faster.

4 Figure (2)

Final **Revision**

Model Exam 5

1 Choose the correct answer:

1 b 2 c 3 a 4 c 5 b

2 Put (✓) or (✗):

1 ✓ 2 ✓ 3 ✗ 4 ✓ 5 ✗

3 Speed = distance ÷ time

= 1200 ÷ 20 = 60 m/sec

4 Classify the following words in the table:

Digestive System	Nervous System	Respiratory System
- Tongue - Anus - Liver - Stomach - Small Intestine	- Brain - Spinal cord - Nerves	- Lungs - Nose - Alveoli

Model Exam 6

1 Choose the correct answer:

1 b 2 c 3 a 4 b 5 b

2 The red car faster because it covers longer distance at the same time.

3 Choose from column (A) what suits it in column (B):

1 b 2 a 3 e 4 d 5 c

4 What is the types of adaptation in the following cases?

1 Behavioral 2 Structural

3 Structural 4 Behavioral

Model Exam 7

1 Choose the correct answer:

1 c 2 a 3 d 4 a 5 [illegible]

2 Put (✓) or (✗):

1 ✗ 2 ✓ 3 ✓ 4 ✓ 5 ✗

3 Classify the following according to the sense that the living organism uses to communicate and survive:

Movement	Hearing Sense	Smell Sense	Touch Sense	Taste Sense
Bees	-Dolphins -Bats -Egyptian mongooses	Ants	Snakes	Panther chameleon

4 Speed = distance ÷ time= 200 ÷ 5

= 40 km/hr

Model Exam 8

1 Choose the correct answer:

1 b 2 c 3 d 4 b 5 [illegible]

2 Put (✓) or (✗):

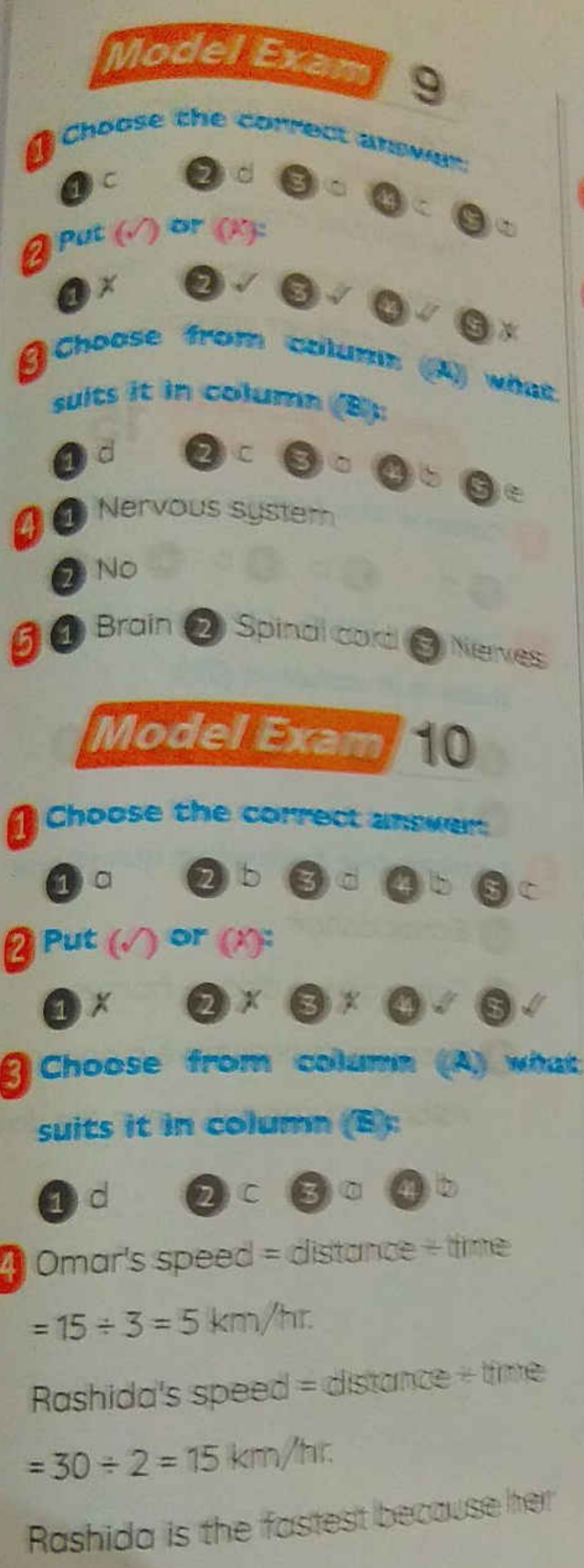
1 ✗ 2 ✓ 3 ✓ 4 ✗ 5 [illegible]

3 Classify the following words in the table:

Shiny Surfaces	Rough Surfaces	Transparent Surfaces
Mirror Metal	Wood	Glass Plastic

4 Choose from column (A) what suits it in both columns (B) & (C):

1 b-c 2 c-a 3 [illegible]



Model Exam 9

1 Choose the correct answer:

1 c 2 d 3 a 4 c 5 a

2 Put (✓) or (✗):

1 ✗ 2 ✓ 3 ✓ 4 ✓ 5 ✗

3 Choose from column (A) what suits it in column (B):

1 d 2 c 3 a 4 b 5 e

4 1 Nervous system

2 No

5 1 Brain 2 Spinal cord 3 Nerves

Model Exam 10

1 Choose the correct answer:

1 a 2 b 3 d 4 b 5 c

2 Put (✓) or (✗):

1 ✗ 2 ✗ 3 ✗ 4 ✓ 5 ✓

3 Choose from column (A) what suits it in column (B):

1 d 2 c 3 a 4 b

4 Omar's speed = distance ÷ time

$= 15 \div 3 = 5$ km/hr.

Rashida's speed = distance ÷ time

$= 30 \div 2 = 15$ km/hr.

Rashida is the fastest because her speed is greater.

Model Exam 11

1 Choose the correct answer:

1 c 2 c 3 a 4 b 5 c

2 Put (✓) or (✗):

1 ✗ 2 ✗ 3 ✓ 4 ✗ 5 ✗

3 Complete using the following words:

1 Fennec foxes 2 Bats

3 Owls 4 Bull sharks

4 Arrange the following steps:

- Light falls on objects.
- Light reflects on the eyes.
- Eye pupils allow the light to enter the eyes.
- Sensory receptors at the back of the eyes send signals to brain.
- Brain translates these signals.

Model Exam 12

1 Choose the correct answer:

1 d 2 b 3 b 4 c 5 a

2 Put (✓) or (✗):

1 ✗ 2 ✗ 3 ✗ 4 ✓ 5 ✓

3 Choose from column (A) what suits it in column (B):

1 d 2 c 3 a 4 b

4 (a) B (b) A - C

Model Exam 13

1 Choose the correct answer:

1 d 2 b 3 a 4 a 5 c

2 Choose from column (A) what suits it in column (B):

1 d 2 b 3 a 4 e 5 c

3 Speed = distance ÷ time

= 100 ÷ 2 = 50 m/sec.

4 - Light falls on the apple.

- Light reflects from the apple to the eye.
- Light enters the eye through the pupils.
- The sensory receptors of the eyes send signals to the brain to translate them.
- The brain translates and processes this information.

Model Exam 14

1 Choose the correct answer:

1 a 2 b 3 b 4 d 5 c

2 Choose from column (A) what suits it in column (B):

1 b 2 a 3 c 4 e 5 d

3 Arrange the following steps:

- The ball is raised up so it stores potential energy.
- The ball moves toward the other balls.
- When the ball hits the first ball.
- Kinetic energy transfers to all the other balls.
- The last ball moves.
- Some kinetic energy changes to sound and heat energies.

Model Exam 15

1 Choose the correct answer:

1 d 2 b 3 b 4 c 5 d

2 Choose from column (A) what suits it in column (B):

1 e 2 d 3 f 4 c 5 a 6 b

3 Answer the following questions:

1 Echolocation

2 Cats - deer - dogs - horses

3 Because snakes have a poor night vision and cannot see in the dark.